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MASS PRODUCTION METHODS APPLIED TO STAMPED REFRIGERATOR PART

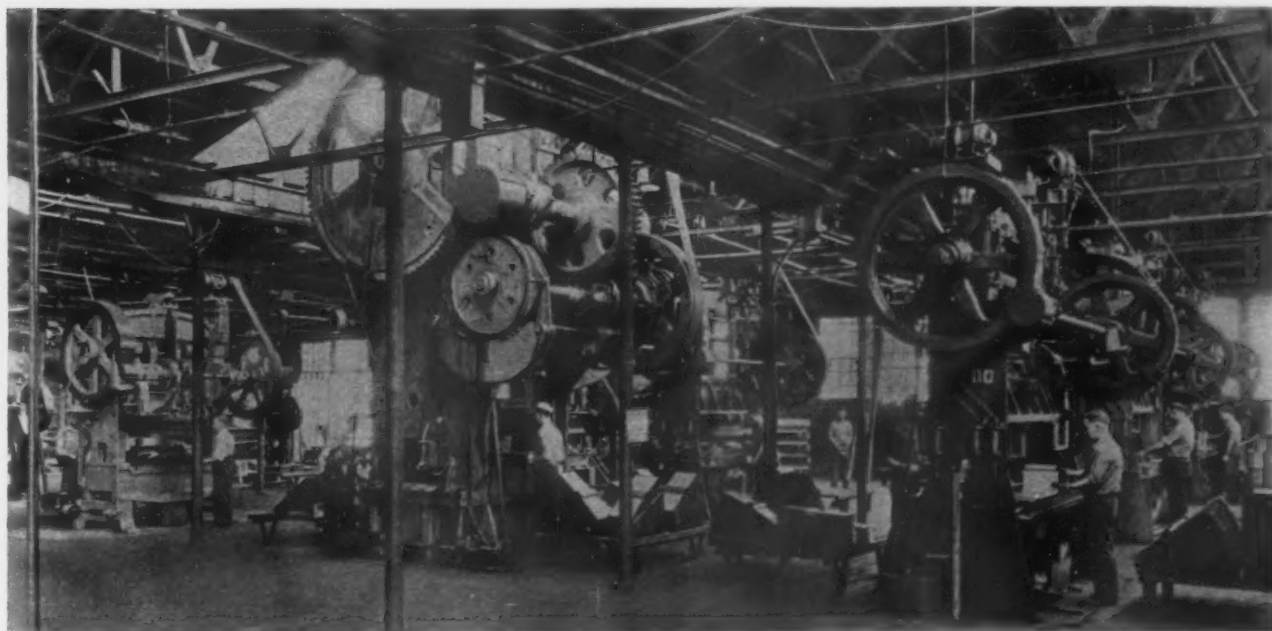
IN equipping its plant to make evaporators for electric refrigerators, the Mullins Mfg. Corp. has laid out a modern mass production system. Following a roughly circular course, the sheet steel stock progresses through stamping, forming, welding, annealing, cleaning, enameling and baking operations, then back to the railroad platform for shipment. Overhead conveyors and continuous ovens serve to keep the work moving without interruptions.

By F. L. PRENTISS
Cleveland Editor, THE IRON AGE

MASS production methods with manufacturing departments arranged for progressive operations are being more generally adopted in the electric refrigerator industry. Increasing output has led to the installation of equipment for more economical production. Improved methods, in turn, have reduced manufactur-

ing costs and sale prices, broadening the market for the product.

In line with progress in this field a plant has recently been equipped by the Mullins Mfg. Corp., Salem, Ohio, to manufacture steel evaporators for electric refrigerators. In this plant there is a flow of work through the various operations and proc-



Line of presses for a series of forming and other operations on evaporator shells. Some of the pieces, which resemble open book covers, are stacked on platforms near the machines.

esses from the time the sheet steel goes to the shearing presses until the porcelain enameled evaporators are packed in cartons, ready for shipment. The plant is divided into three main production departments: stamping, assembling and enameling. In addition, there is a department for annealing and sand blasting. The work in its routing follows a nearly circular course—from the platform on which the sheets are unloaded from cars and back to the same platform for shipment.

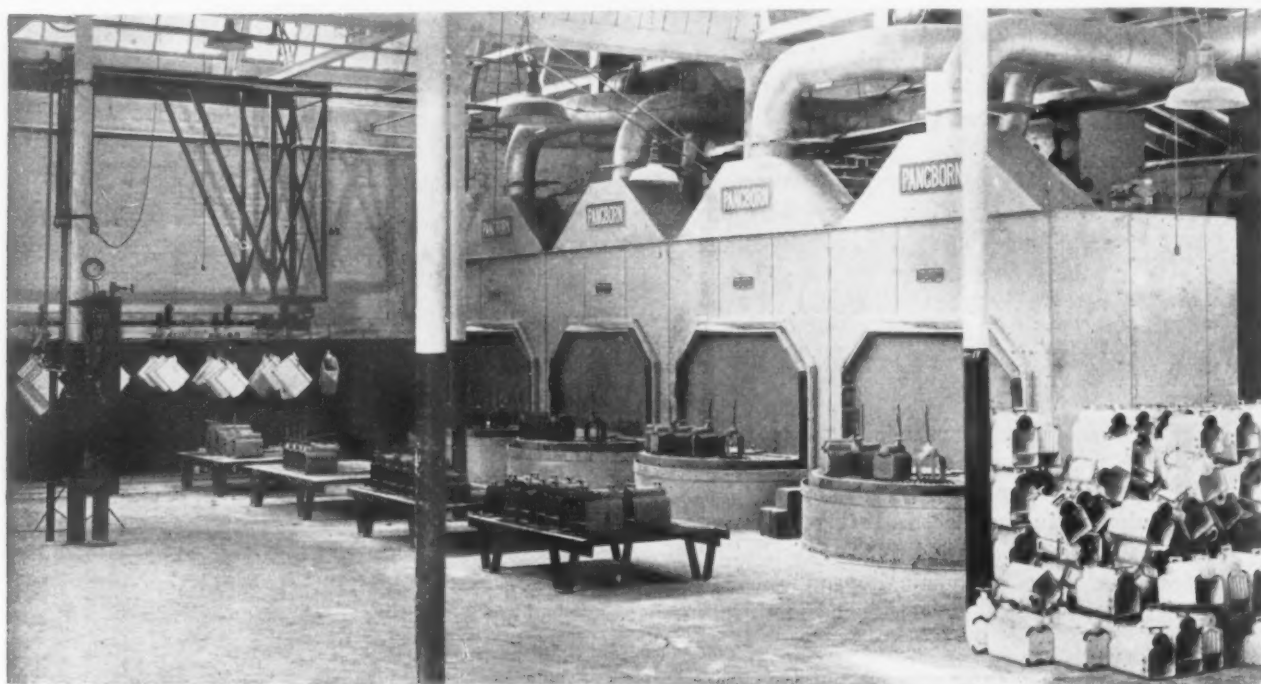
Some Evaporators Require 476 Spot Welds

Economies have been effected in production methods by handling work through the enameling department on a continuous overhead conveyor. Fabrication involves numerous welding operations, most of which are done on automatic and other types of

cube trays. The evaporator has an inner and outer shell. When the two shells are joined a series of beads that have been stamped in the outer shell provide a series of tubes around the shell connected with the header through which the refrigerant circulates.

Evaporator Made of Two Main Stampings

The entire unit, exclusive of hangers and minor parts, is made of two stampings. The stock, vitreous enameling sheets usually in 18 gage, is first cut in blanks on squaring shears in sizes ranging from a minimum of 11 x 22 in. for the inner shell to a maximum of 14 $\frac{3}{4}$ x 33 $\frac{1}{4}$ in. for the outer shell, depending on the size of the evaporator. The blanks go through a series of operations, including forming the boiler at the center of the piece, notching and



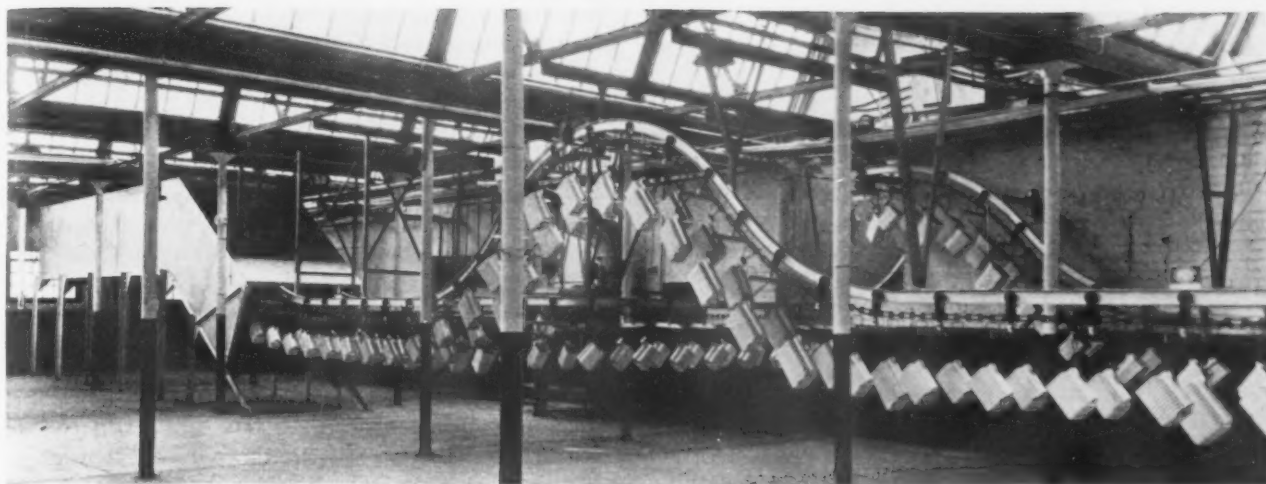
Battery of revolving table machines where parts are sand blasted after annealing. Following final inspection and minor adjustments, the evaporators are hung on the conveyor at the left, which makes a circuit through the enameling department.

welding machines that are set up in the production line. As many as 476 spot welds are made on some types of evaporators. An outstanding advantage claimed for the production methods followed is the assurance of a uniform, high-quality product. There are frequent inspections of work in process, as well as tests of the evaporators to make sure that they are gas-tight. The Mullins company has brought out a standard evaporator unit on which it has patents; in addition, it manufactures evaporators to meet the special specifications of some of the refrigerator manufacturers. Its evaporator department is laid out for the manufacture of 1000 units in 24 hr., although this may be increased considerably by adding equipment for certain operations.

The evaporator consists in the main of a cylindrical header or boiler which serves as a float chamber or refrigerant reservoir, and a rectangular shaped case or freezing chamber to receive the ice

piercing, forming the beads on the outer shell and finally bending the ends up to an angle. The piece then roughly represents in shape a book nearly wide open, picturing the ends as the book covers and the semi-cylindrical center that forms the boiler as the back of the book.

Beads formed on the outer shell have a 7/32-in. outer radius and are 7/8 in. between centers. There are 12 to 15 of these parallel beads or tubes on each unit. They must be perfectly flat on the engagement surface between the inner and outer shells to permit proper conditions for spot welding. In order to form the beads and obtain a flat contact surface, a very heavy blow of 1000-ton pressure or more is required, and for this purpose a single-action single-crank press of 1500-ton capacity is used. Other stamping operations are done on single-action single-crank presses. The press equipment is arranged in line for progressive operations.



The enameling room conveyor carries work to dipping tanks and spraying booths, then through the drying oven shown at left. It serves also as a cooling conveyor.

On leaving the press room, the stampings are inspected for defects and for cleanness, including freedom from rust. The first assembly operation is tack welding a narrow filler strip around the inner side of each outer shell. This is to increase the thickness of the edge so that the enamel will be less likely to crack, the edge having three thicknesses of metal after the two shells are assembled together. Then the inner and outer shells are assembled, a jig being slipped over the boiler to locate the two pieces which are tack-welded adjacent to the boiler with a small spot welder. Then a row of spots is welded on each side of the boiler with a foot-operated spot welder.

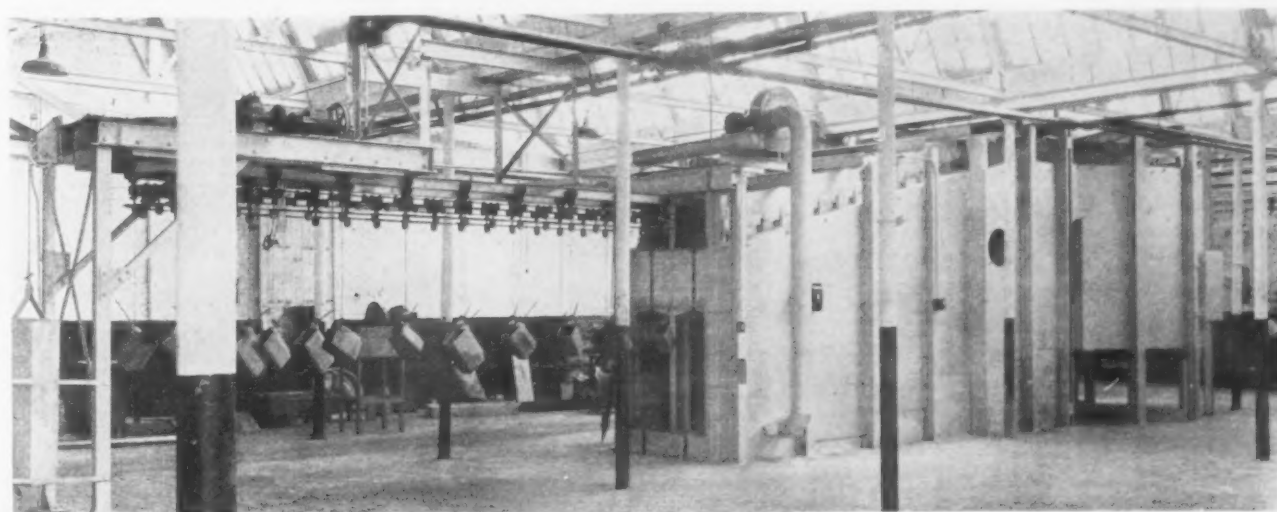
Following this operation the work goes to an automatic spot-welding machine with which the two pieces are welded together between successive rows of heads by a series of spot welds on $\frac{5}{8}$ and $\frac{3}{4}$ -in. centers. Perfect welds are required for this welding, as well as for that on the sides of the boiler, for the reason that the boiler and tubes must withstand a pressure of 250 lb. per sq. in. The welding machines are inspected frequently to make sure that they are functioning properly. The next operation is the making of a continuous seam around the three

outer edges on each end of the piece. In this operation three thicknesses are welded together, the two shells and the filler strip. Then the edges of the entire stamping are trimmed and the sides of the piece that become the ends of the evaporator are ground and buffed to provide a smooth edge for enameling.

Jigs Used in Final Forming

Final forming, which is done in two dies on one press, follows. In the first operation the two sides are bent over to take their finished shape. Then the piece goes into the second die in which one end is folded over and then the other end, bringing the two ends approximately together.

After this the piece is put in a wedge-type jig in which the ends are tack-welded. Following this the joint is acetylene-welded on both the inner and outer sides of the shell. The shell is then resquared in a restrike press. Then the boiler ends, tubes and hangers, control lugs and studs are acetylene-welded to the shell, as well as tray slides that are placed on the inner side of the evaporator. After the final welding operations the welds are smoothed by filing and with pneumatic grinding wheels. All the gas



A continuous overhead conveyor carries the evaporators through this continuous-type electric furnace, where strains caused by welding are removed.

welding is done with the oxygen removed by either gas or a volatile liquid to eliminate scaling of the interior.

Testing comes next in the sequence of operations. Types of evaporators having suction and inlet tubes are tested under water with 100-lb. air pressure for leaks in the welds. Then all units are tested under water with nitrogen gas under 150-lb. air pressure. Nitrogen is used for this testing as it drives out the oxygen in the air and tends to prevent the formation of scale within the boiler and tubes. If leaks develop they are repaired by gas welding after this inspection and retested.

The evaporators are annealed before enameling in order to relieve strains in the steel caused by the welding operations and to remove any oil left on the surface of the metal. Annealing is done in a continuous-type 250-kw. electric furnace. The furnace chamber at the front entrance inclines upward to the heating zone at the back, which is elevated to hold the heat. A continuous conveyor on which the work is suspended loops through the furnace. The unit is annealed at 1650 to 1700 deg. F. The furnace has a capacity of 180 pieces an hour.

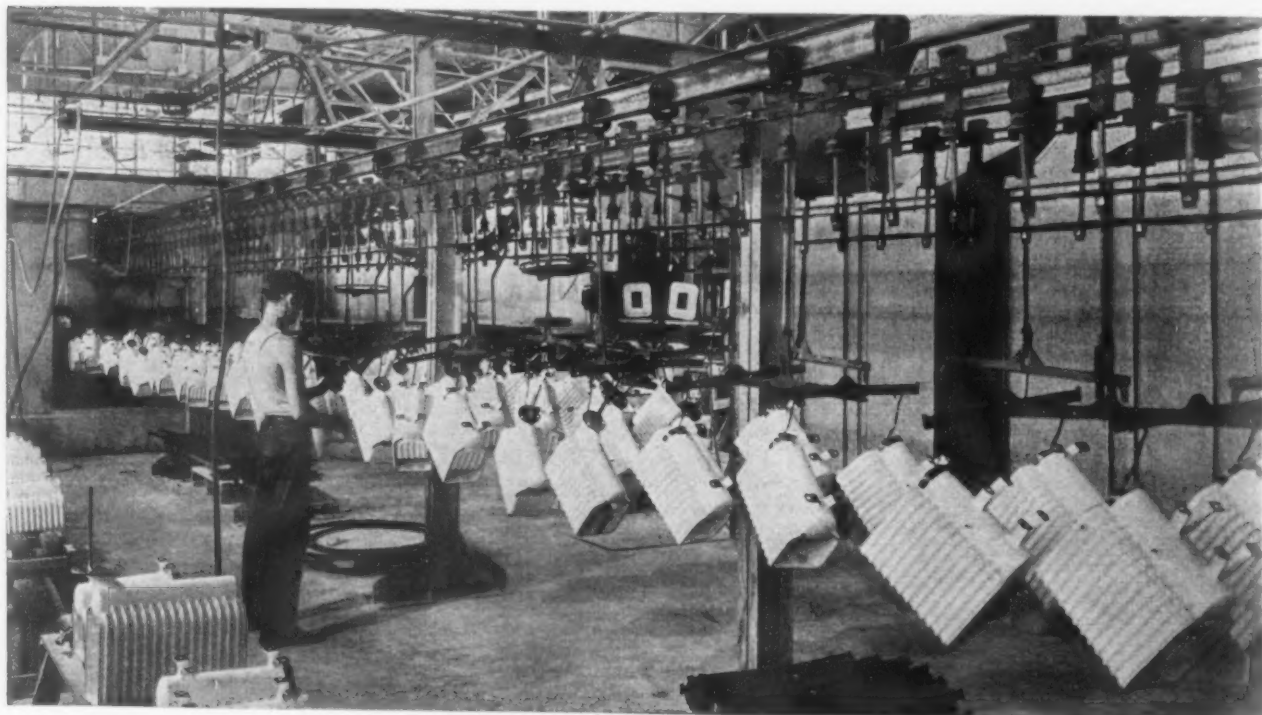
Sand Blasted After Annealing

Sand blasting to remove scale follows the annealing operation. This is done on a battery of four revolving-table and sand-blast machines located a short distance from the annealing furnace. Following sand blast the evaporators are again inspected, the boiler and tubes being subjected to 250-lb. air pressure to reveal leaks, should any exist. Hangers are straightened and any burrs or rough spots that are left on the surface are filed off. A great deal of hand labor is avoided by carrying work through the enameling department on a continuous overhead conveyor. This starts in front of the sand blast in the adjoining cleaning room and makes a circuit

through the enameling room. This serves as a cooling conveyor, as well as for handling the pieces between operations. Pieces are allowed to make one or more additional circuits of the conveyor should they reach the point of one operation faster than they can be given that operation.

After minor operations following sand blasting the evaporators are hung on the conveyor and are carried to the point in the enameling room where the ground coat is applied by dipping. This is done in wheel-mounted tanks that are set at the side of the conveyor line. After dipping, the pieces are hung back on the conveyor, which loops through a gas-heated drying oven, where they are dried in a temperature of 300 deg. F. From this oven the conveyor carries the work to the side of another continuous conveyor, which takes it through the burning furnace. This is a 425-kw. furnace of the closed-end type. The conveyor loops around the heating chamber at the back of the furnace and brings the unit out through the entrance. Here the evaporators are hung back on the overhead conveyor and taken to the side of the room, where they are given two white coats. Some of the white coats are applied by dipping, others by spraying. After the application of each white coat the pieces are hung back on the conveyor and the drying and burning operations are repeated.

Evaporators, after inspection following enameling, are given a 110-lb. air pressure test while immersed in Stoddard's solvent. This has cleaning qualities and, being of lower specific gravity than water, very small leaks in the boiler or tubes are revealed by bubbles that might not be observed should the evaporator be tested under water. Final visual inspection and touching up follows after which the evaporators are packed, four to a carton, for shipment.



Another view of the enameling department showing evaporators entering the electric burning furnace.

THE AUTHORITY OF REASON

OUR anti-trust laws prevent agreements to restrict production to known demand. They even prohibit maintenance of prices at production cost levels.

The result is a dislocation of employment and wages and a serious undermining of consumer purchasing power. While it is becoming apparent that the public will demand protection from these evils, the operations of legislative machinery are so slow that early statutory relief is unlikely.

Meanwhile no effort should be spared to educate industry to the necessity of voluntary self-regulation. Reason dictates, says Mr. Charls, that personal selfishness shall give way to a sense of duty to competitors and to society at large.



By GEORGE H. CHARLS

President, National
Association of Flat Rolled Steel
Manufacturers

IN the United States the only authority by which trade associations and institutes may function is the authority of reason.

The law prohibits manufacturers from agreeing among themselves to limit the squandering of a nation's wealth in creating over-capacity; it prohibits agreements to regulate reasonably existing capacity to the known demand; it condemns any agreement to maintain a price level even at production cost.

In these three prohibitions alone it obstructs the stabilization of employment and wages, and, by the same token, constantly undermines consumer purchasing power.

It seems quite incomprehensible that such laws should exist in a civilized nation, yet paradoxically they do in the United States.

Therefore, any effort to rationalize an industry in this country and at the same time remain free of legal or political entanglements must find root and nourishment only in the authority of reason.

If, for instance, the demand on an industry falls to 25 per cent of such industry's productive capacity, is it best for all concerned that each producer limit his production to 25 per cent; or is it really in the public's interest for one or two concerns to run full while the rest are shut down, whole communities

thrown out of work and organization disintegrated; or is it unquestionably in the public's interest that all units in the industry decide to run full—tear away at each other's throats, pauperize wages, salaries and dividends, wear out machinery and squander natural resources—only to find in the end they have all been operating at an average of 25 per cent, the equivalent of the demand?

UNDER the law, no agreement on these problems is permissible, although it is difficult to understand by what logical deduction it can be held "in restraint of trade" to limit vast surplus sources of production to a known demand in a period of under-consumption, when there is little or no trade to restrain.

Therefore, only by recourse to contact, sound thinking, discussion and analysis of all the facts can a group opinion be created in answer to these questions which will have the backing and the authority of reason. Then it remains for each individual in the industry, with foreknowledge of the consequences, to choose which course he will pursue. There is no excuse for irrational impulses.

To assemble and measure all facts pertaining to an industry; to view them in the light of the individual's and the industry's best interest; to see in advance the far distant results of any course of action; to blend

personal viewpoints into the viewpoint of the group—these are the activities each industry must achieve before it can claim to operate with the authority of reason.

It is well known there are some individuals in each industry who recognize no authority except their own personal interest. There are many who have individualistic convictions which only persistent reasoning and enlightenment can enlist in the cause of the group's welfare. Yet, when it is brought home to such as these that at best even they can barely exist if the rest of their industry, in distress, is sorely pressed, it is very probable they, too, will have an inclination to yield to the authority of reason.

BANKERS, stockholders, labor, are accepting the principle of associated effort and recognizing that the enduring success of such effort can only obtain as this authority is established.

Thus a sense of duty to group welfare is being created which will in time supplant individualistic impulses now disregarding any authority. When this sense of duty is sufficiently aroused, the inherent satisfaction man finds in attempting to fill it will prevail. Then unseemly and destructive willfulness will no longer add to the unavoidable distress of fluctuating demand.

The authority of reason emphatically dictates certain cardinal principles and one is that business shall not be conducted without benefit of morals.

It puts the question squarely—if morals are to be a matter of geography and truth the plaything of time, by what national or international standards shall industry be governed?

Is it moral or immoral to repudiate a contract? Is there such a thing as security in a written obligation between parties who do not know the meaning of a moral obligation, who ridicule the term *immoral* because they are unconsciously *unmoral*?

Can enduring business ethics be promulgated out of an immoral or unmoral attitude of mind and shall business and commerce be unconcerned with the question of morals?

Is it impossible for industry to adopt a universal standard which shall draw a sharp and unmistakable line of demarcation between that which is moral and that which is immoral, regardless of geography or time? Shall sharp practice and subterfuge be ostracized?

Can any attempt to erect a permanent standard of business ethics be other than a farce, and business a mesalliance of the crafty and the honorable without benefit of morals, so long as those deficient in moral perceptions can succeed and remain members in good standing of the business fraternity?

REASON dictates an unequivocal answer to these questions. Business and commerce will put their house in order; they will submit moral perceptions to the refining influences of the crucible of the new economics. Fortunately, there is adequate high-minded business leadership to accomplish this task and it knows full well the cleansing cure must come from within and not from without.

A new business statesmanship of a higher order than heretofore conceived will prevail because the authority of reason demands a new business code—sincere, dignified and worthy of the tremendous economic, social and political responsibilities being thrust upon the business executive.

In this metamorphosis the strong and worthy, possessors of background and tradition, by nature honorable, are giving of their strength and power, by precept and example, to point the way.

A new aristocracy is in the making which will hold high the principles of ethics and the value of the authority of reason as the indispensable qualification of business success and leadership in the future.

▲ ▲ ▲

Lubricants Used in Deep-Drawing of Sheet Steel

IN a paper devoted to the use of lubricants for deep-drawing, presented before the American Society for Steel Treating, at Boston, Maurice Reswick, Pennsylvania Lubricating Co., Pittsburgh, stated that a film or coating must be formed on the metal which will be strong enough to withstand the enormous pressure and avoid metal-to-metal contact, under both static and moving conditions. Its coefficient of friction must be low. It must spread out under the die action to form a protective film ahead of the incidence of stress.

It must be susceptible to ready cleaning for further use. It must be non-corrosive and stable. It must have no detrimental effect upon the skin of either the product or the tool. There must be no perceptible or disagreeable odor from it, or any pronounced change in its consistency through variations in temperature.

Finally, the lubricant must be low in cost. This does not mean that the cost must be based on dollars to the pound or gallon of the material itself, but on dollars to the ton of satisfactory product made through the agency of the lubricant. Practically, there must

be a compromise among these various features, in which a gain in one may offset or partially offset some other point mentioned.

In the discussion, doubt was expressed by E. V. Crane, E. W. Bliss Co., Brooklyn, if enough heat is ever generated in a press operation to fuse the steel to the die, as was suggested by one speaker. There may be, however, a sufficiently intimate bond produced between the steel in the die and the steel being drawn so that, when the crystals are oriented enough in the same way in the two materials, some crystals may be pulled out from the softer metal and gradually build up into the shape which fusion might take.

Another speaker warned against the use of graphite in a lubricant for press operations, because of the difficulty in keeping it in suspension. He recommended the use of lead oleate as an item which might well replace tallow and graphite and a great many other types of fillers. However, this material is not soluble in water, and thus the lubricant cannot be cut back and it is difficult to wash off from a surface.

PROPER GRINDING OF TUNGSTEN-CARBIDE TOOLS

THE basic role of proper grinding in the successful use of tungsten-carbide cutting tools is emphasized and some of the grinding practices of the Widia department of Friedrich Krupp, A. G., as determined by extensive research, are outlined. In a second article, Mr. Prosser will discuss the proper maintenance of Widia-tipped milling cutters.



By ROGER D. PROSSER

Thomas Prosser & Son, New York,
American representative of Friedrich Krupp, A. G., Essen,
Germany.

HAND grinding a tool for roughing cuts. Hollow grinding, caused by holding the tool against the periphery of a small wheel, should be avoided.

TO OBTAIN the best results with Widia cemented tungsten-carbide cutting tools, proper grinding is essential. Although this basic requirement has often been emphasized, very bad practice is sometimes still seen, even in the best class of shops, in respect to the grinding of both high-speed steel and tungsten-carbide tools.

It is highly desirable to have all tungsten-carbide tools ground in the toolroom, and a personnel should be built up of skilled operators who have been carefully instructed and trained in the proper grinding

procedure for these valuable tools. No inexperienced operator should ever be allowed to grind a tungsten-carbide tool. In shops where such procedure has been followed, it is very noticeable that the results obtained are much better than in shops where each workman is allowed to grind his own tools.

The grinding of tungsten carbide cannot be done in a haphazard way; the operator must use his machine to the best advantage, choosing carefully the proper type and size of wheel for the work to be done, as well as proper grinding speeds and feeds. It is

Material to be Machined	Clearance Angle $\alpha \pm 1^\circ$	Tool Angle β	Our Lip Designation
Soft Steel	4°	$60 - 65^\circ$	S
Hard Steel	4°	$65 - 74^\circ$	HS
12% Manganese Steel	4°	$80 - 84^\circ$	MN
Stainless Steel	4°	$65 - 74^\circ$	HS
Chilled Cast Iron	3°	$82 - 86^\circ$	CCI
Soft Steel Castings	4°	$68 - 73^\circ$	HS
Hard Steel Castings	4°	$73 - 78^\circ$	CI
Grey Cast Iron	4°	$74 - 80^\circ$	CI
Bronze, Brass, etc.	6°	$65 - 75^\circ$	BR
Aluminum Alloys	8°	$50 - 55^\circ$	AL
Planer Tools	As above but with Negative Back Rate $12^\circ - 15^\circ$		P

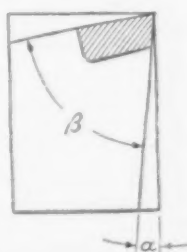


TABLE of proper tool angles for cutting various materials.

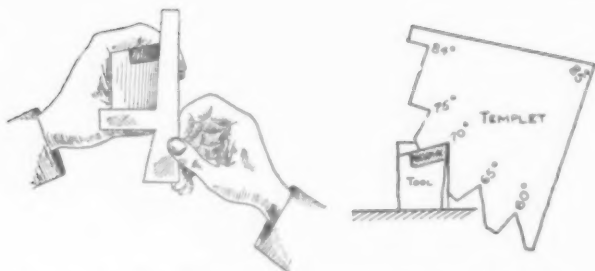


Fig. 1.—If much grinding to any particular set of angles is done, simple gages or templates may be used to advantage. The gage at the left is shown checking the clearance.

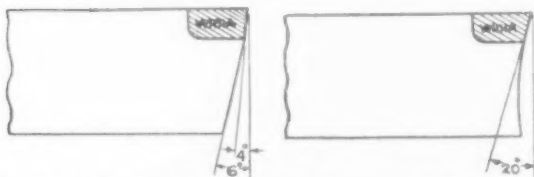


Fig. 2 and Fig. 3.—The proper and improper grinding of the clearance on a Widia tool is shown at the left and right respectively. Improper methods result in a greatly weakened cutting edge.

much less trouble to grind all tools on one and the same grinding wheel, but to secure proper results the wheel must be selected to suit the characteristics of the material being ground, taking into consideration the finish desired. If this rule is observed, the improved results will be well worth while, and this applies not only to tungsten-carbide, but also to high-speed steel tools.

Widia cemented tungsten-carbide, a very hard and dense material, cannot be ground successfully with the ordinary grinding wheels. Extensive research has resulted in the production of excellent special wheels, so that it is now possible to grind properly with very little difficulty, if ordinary intelligence is employed.

The special wheels are of selected crystals of silicon carbide, with a softer bond than customary. They cut tungsten carbide quite freely, although with somewhat more wheel wear than usual. This free cutting results in only a slight heating of the Widia metal, which does not harm it, whereas overheating is very destructive.

Grinding Studied Thoroughly at Krupp Works

A visit to the Widia department of the Krupp steel works at Essen, where the original tungsten-carbide tools were developed to the point of commercial use-



Fig. 5.—Cracked tool resulting from local overheating through rigid grinding.

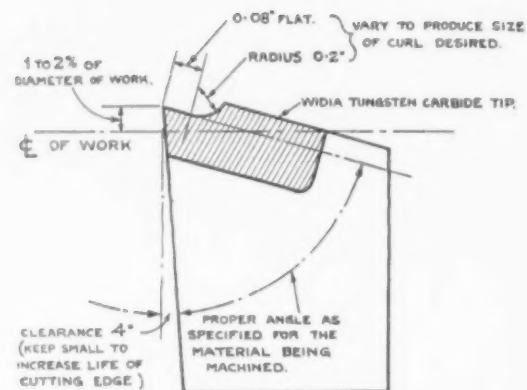


Fig. 4.—In grinding the chip breaker on the top of the tools it is most important not to weaken the cutting edge. A satisfactory method is shown above.

fulness, affords an excellent opportunity to study proper grinding methods. For, at that plant extensive practical cutting tests on specially designed lathes and other machines have amply demonstrated the prime importance of proper grinding in getting the most out of these remarkable tools. Some of the practices and recommendations of the Krupp company are given in this and the subsequent article, with illustrations of operations in the Krupp Widia department. The writer is indebted to the Krupp company for the illustrations, and also to Bruno Leder for some of the data, which is abstracted from his paper in Krupp's *Monthly Journal* of March, 1931.

Special grinding wheels for tungsten-carbide must be used both for roughing and finishing the Widia tungsten-carbide tip. The usual wheels employed for grinding high-speed steel tools are positively not suitable for tungsten carbide. Small tools for light work and forming, and other tools which must produce a fine finish should be ground on wheels of extra-fine grain. When an especially high finish is required on the work, the cutting edge of the tools should be brought up to the best possible finish by lapping.

Wet Grinding Eliminates Harmful Heating

Wet grinding should be employed wherever possible. This is of great advantage, as it overcomes the heating up of the tools and permits continuous grinding without waiting for the tool to cool down so that it can be held in the hand. It permits faster grinding, and results in less glazing and loading of the wheel.



Fig. 6.—Deep cracks in Widia tip resulting from rigid full automatic grinding.



Fig. 7.—Group of typical grinding cracks, magnified 7 1/2 times.



Fig. 8.—Various classes of grinding finish, all specimens magnified 20 times.

The cooling water should be kept clean and free from grit, and should flow copiously, as too little water is worse than none at all. The tools can, if necessary, be ground dry, but in this case they should be ground carefully and with only light pressure so that they are not overheated. The tungsten-carbide tip must positively not be quenched in water while hot, as this will crack the metal, rendering it unfit for further use.

Proper grinding equipment is essential. The wheels should run true and without vibration, as with wobbling wheels or vibration due to loose bearings, it is absolutely impossible to secure a proper finish on the tool. If considerable metal is to be removed, roughing wheels of large size, with plenty of power back of them, should be employed. When this is done, it will take very little longer to grind tungsten-carbide tools than would be the case with similar high-speed steel tools.

Wheels which have become glazed, loaded up, grooved, or out-of-round, should be carefully trued with a first class dresser and finished off with a diamond dresser. Glazed or loaded wheels do not cut freely, and cause overheating. Where smaller wheels are to be formed to special shapes, the diamond dresser is indispensable.

The wheels should run at the correct speed as recommended by the manufacturer, and the size and style, as well as grit, grain, and grade, should be

selected specifically for the kind of grinding to be done.

Proper Tool Angles to Be Maintained for Particular Applications

PROPER tool angles, as recommended for the various materials being machined, should be maintained exactly. Widia tools are not made for general utility. Each tool is designed for cutting a particular material and for a particular application, although a single tool can be used for various operations if properly applied. The accompanying table shows the proper angles for several different materials; if much grinding to any particular set of angles is to be done, simple grinding gages or templets, such as shown in Fig. 1, will be found to be of assistance. These show a method of gaging both the clearance and lip angles.

When regrinding, it is advisable as far as possible to grind on the front or side rather than on the top, as this maintains the thickness of the tip and the proper top rake angle.

It is especially important to maintain the clearance angle within the limits specified in the table, and this should be done so that no hollow grinding occurs, which would produce greater clearance angle than is apparent. This is clearly shown in Figs. 2 and 3. In spite of repeated cautioning, it is not at all uncommon



Fig. 9.—Grinding a tool for finishing cut. Note ample stream of coolant.



Fig. 10.—Lapping a Widia grooving tool on a wheel having special lapping characteristics.

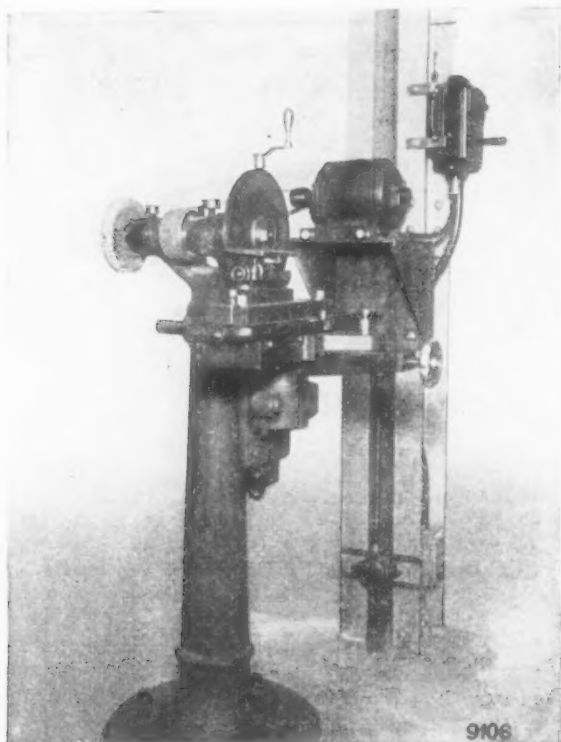


Fig. 11.—Lapping equipment with vertical disk. A horizontal disk arrangement may also be used.

to see tools which have had the clearance hollow ground on the periphery of a small wheel, a practice that is the cause of much grief with tungsten-carbide tools. Tools for machining cast iron should have a clearance angle of about 4 deg.; this is very important and in many cases the length of time between grinds has been greatly increased by reducing the clearance angle from 6 or 8 deg. down to 4 deg. The amount of clearance, however, will necessarily vary, depending upon the size of the work, setting of the tool with relation to the center line, etc., but such variation should not be more than plus or minus 1 deg. from the specified clearance.

The clearance angle on the shank material can be ground back slightly (not over 2 deg.) more than the angle on the Widia tip (note Fig. 2), using an ordinary grinding wheel for this purpose. This greatly

facilitates grinding of the Widia cutting edge, and saves wear and loading up of the special wheel with the soft-shank steel.

Precautions in Grinding Chip Breaker

When it is necessary to grind a chip breaker on the top of the tool, it is most important not to weaken the cutting edge, as in the usual procedure. A satisfactory method of grinding a chip breaker is shown in Fig. 4; and it should be carefully noted that this is *not* accomplished by hollow grinding of the top of the tool. Instead, it is obtained by grinding a flat near the edge, and parallel with the top surface of the tool. A small radius at the back of this flat produces very satisfactorily the proper form of chip, and the dimensions of the curl can be regulated by the width of the flat and the dimension of the radius. With this method, the correct angle of the cutting edge can be maintained for the material being machined, and the tool is not weakened as in the case of hollow grinding.

The direction of rotation of the wheel should be such that the grinding is toward and not away from the cutting edge. This will assist in avoiding the chipping out of the edge.

Full-automatic grinding, more especially where the wheel bears rigidly on the surface of the Widia tip, has not up to the present proved very satisfactory. Grinding cracks are easily produced in the tungsten-carbide tip through overheating; furthermore, a wheel with a very soft bond must be used, and this results in excessive wheel wear. With such a rigid method of grinding, local overheating occurs at the point of contact between the wheel and the metal. A strain crack resulting from such overheating is shown in Fig. 5. If considerable pressure occurs, the forming of cracks is almost unavoidable.

The same thing happens when grinding the surface of tools on a surface grinder, and when too much down feed is employed, a network of fine grinding cracks such as shown in Figs. 6 and 7, is almost always produced in the tip. The strength of the copper braze is also seriously affected, sometimes to such an extent that the tip is shifted on its seat.

Semi-automatic grinding is possible, and the feeding of the tool or grinding wheel should be done by



Fig. 12.—Free-hand roughing of a wide Widia tool on the periphery of a large wheel.

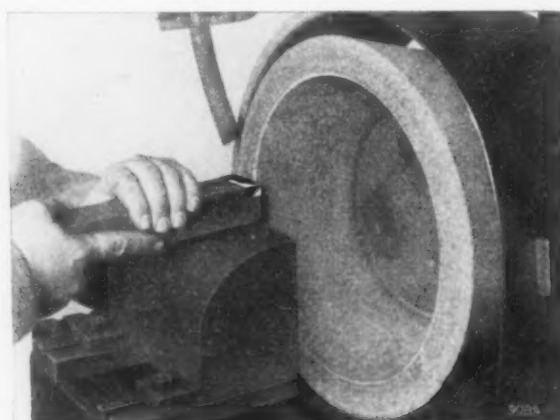


Fig. 13.—Free-hand finishing of the tungsten-carbide tool on a cup wheel.

hand, so that there is some resiliency or give between the wheel and the work. In this class of grinding, a wheel should be used having a softer bond than for hand grinding; this results in slightly more wheel-wear, but is essential to avoid overheating and cracking of the tungsten-carbide tip. The feed should not exceed 0.0005 in. per pass.

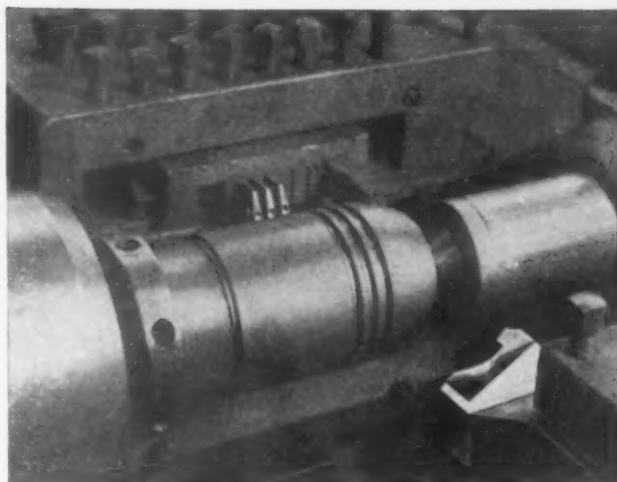
Proper Grinding Procedure for Various Classes of Tools

Various grades of cutting edge, magnified 20 times, are shown in Fig. 8; these will be used as a basis of describing the desired finish. Good grinding practice on tools for various classes of work is as follows:

1.—Turning tools for roughing cuts and general run of work not requiring especially good finish: Grind on medium coarse roughing wheel (finish A, Fig. 8) and finish on wheel of finer grain to produce a finish like B. The roughing tool grinding procedure is shown in the head-piece of this article.

2.—Tools for finishing cuts: Grind as above, and in addition touch up the edge on an especially fine wheel to give finish C. The grinding of a tool for a finishing cut is shown in Fig. 9.

3.—Tools for work requiring extra fine finish, also thread chasing tools, piston grooving tools, forming tools, reamers, etc.: Grind as above, producing successively finishes A, B and C, and then finish off on a Belgian cast-iron lap, charged with diamond dust or other fine abrasive,



or on a wheel which produces a finish comparable with diamond lapping. The finished cutting edges should appear like that at D. Lapping equipment is shown in Figs. 10 and 11.

4.—Special tools with very wide cutting edges, such as those employed for turning chilled cast-iron rolls: Grind on a large wheel with sufficiently wide face. It is absolutely necessary to avoid hollow grinding of the clearance, but the rough grinding can be done on the periphery of a large wheel, followed by finish grinding on a broad-faced cup wheel, if possible. The broad-faced wheel minimizes wheel-wear, and assists in producing an edge that is straight. The resulting finish should be like that at B. This grinding procedure is illustrated in Figs. 12 and 13.

A little experience will soon enable the operator to produce without difficulty the proper finish for the various classes of work. And, as suggested above, careful attention to proper grinding procedure will be found to bring ample returns in the form of materially improved tool performance.

The grinding procedure for Widia-tipped milling cutters and a summary of the important rules for grinding tungsten-carbide tools will be given in a second article.

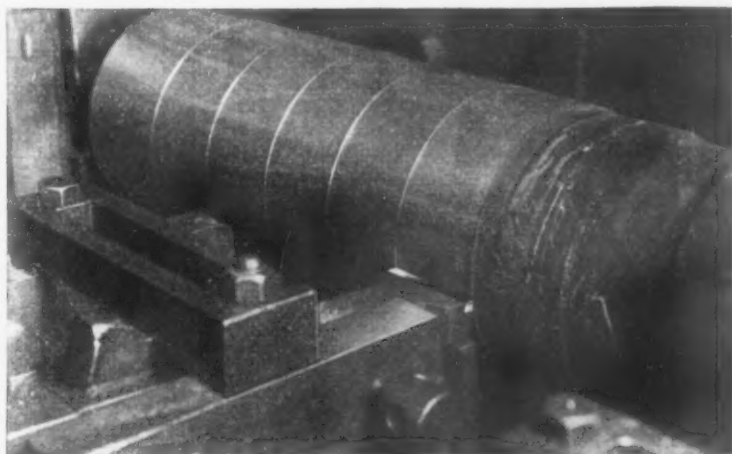
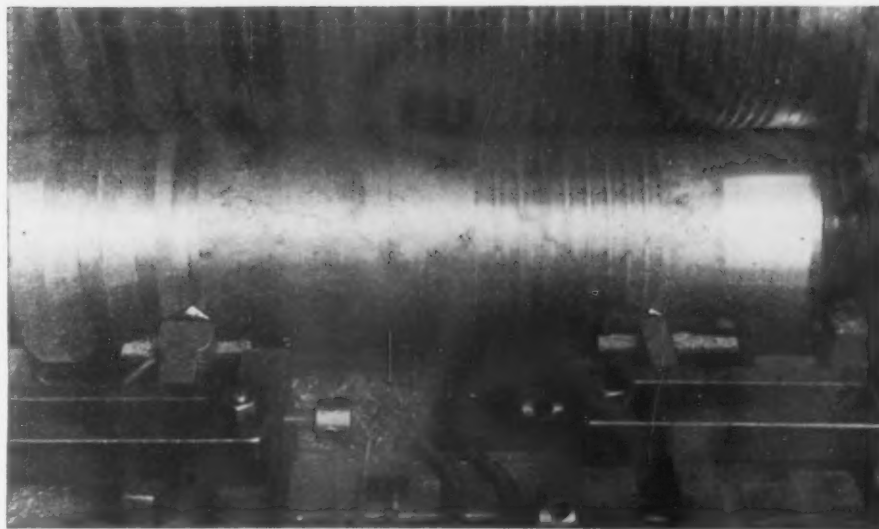
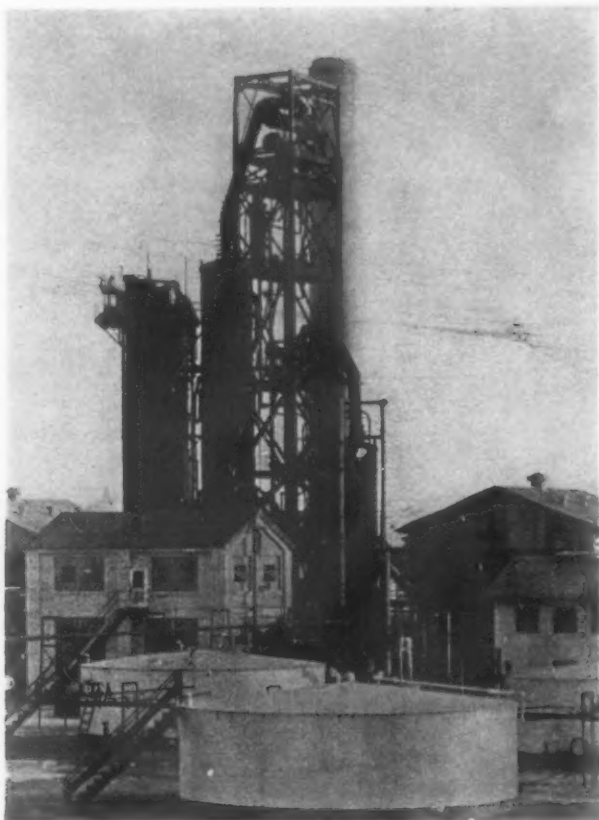


FIG. 14.—(Top of page) Widia tools grooving and forming an aluminum alloy piston, high in silicon.

Fig. 15.—(Above) Machining chilled cast iron rolls using transverse hand feed.

Fig. 16.—(At right) Roughing the profiles of chilled iron rolls with Widia tungsten-carbide tools.





THIS is a typical modern cracking unit of design similar to that of the unit now nearing completion at Bayonne, N. J. * * *

WELDING AND TESTING A NEW CRACKING UNIT

WHEN the American Society of Mechanical Engineers published in June of this year a revision of the boiler code to include non-destructive tests of high-pressure welded vessels, a progressive step was taken of greater significance than generally appreciated. Since then for the first time fabricators and users of such vessels have had a standardized and authoritative basis for acceptance or rejection of important welded construction. One of the first large projects to go forward under the new specifications was the extensive plant of a modern cracking unit for the Tide Water Oil Co., now nearing completion at Bayonne, N. J.

This unit, like other recent cracking units, contains in addition to storage tanks and transfer piping, two reaction chambers forged from single billets and four welded drums all designed for high pressure and high temperature operation. In the Bayonne unit the bubble tower, the largest of all the drums, is thought to establish a record for size of high-pressure welded vessels. It is 12 ft. in diameter and 90 ft. high and weighs over 200 tons. The three other containers are known as a separator, which is 11 ft. in diameter and 45 ft. high, a flash tower, which is 5 ft. in diameter and 33 ft. high, and a horizontal accumulator 10 ft. in diameter and 30 ft. long.

All of the welded vessels were built at the Barberton, Ohio, works of the Babcock & Wilcox Co.

and the work of erecting the unit at Bayonne is under the direction of the Walter E. Lummus Co., New York. Some idea of the size of a modern cracking unit may be gained from the fact that more than 1500 tons of steel is called for in the construction of this one unit.

The bubble tower, which was built up complete at Barberton and shipped to the plant site, is one of the largest single pieces ever to be carried on freight cars. It represents in fact the practical limit of size and weight of the transport capacity of the country's railroads. In the equipment of all the railroads there were but nine cars of required capacity and the shipment was made on two of these. All the curves and tunnels and clearances on the route taken by the tower from Barberton to Bayonne were surveyed and studied. It was necessary to make the shipment in easy stages during daylight and to arrange for no traffic on the opposite track at the times when the tower was rounding sharp curves. The two reaction chambers, which were forged at the plant of the Bethlehem Steel Co., Bethlehem, Pa., weighed 150 tons each but were only 47 ft. long.

Tests Unusually Complete

It would be difficult if not impossible to construct a cracking unit of modern design without welding. In the case of the four large vessels all joints were butt-welded with the surfaces of the joining edges machined to form and with the weld built up from

one side in layers, as shown in Fig. 3. The general method of welding and testing followed practice previously adopted at the Barberton plant, but because of the size of the tanks and the extent of the work, some special features were called for. The work was carried forward at a rapid rate with ten welding arcs operating simultaneously and with the testing of welds carried on as the work progressed. The method of making the tests has been described in considerable detail in connection with previous work and the technique in the use of the X-ray at the Barberton plant was outlined by Dr. Ancel St. John, St. John X-ray Service Corp., New York, in an article which appeared in the Dec. 18, 1930, issue of THE IRON AGE. The simple theory back of the X-ray test Dr. St. John gives as follows:

The X-rays used for the examination of heavy metal sections are produced when electrons traveling at high speed in an exhausted bulb strike a heavy block or "target" of tungsten placed at the center of the bulb. The electrons are supplied by a heated filament as in a radio tube and the speed is imparted by applying an extremely high voltage between the filament and the target. The X-rays thus produced are passed through a portion of the wall of the vessel under examination including a portion of a welded seam and are recorded on a photographic film placed on the far side of the wall. Cavities, cracks and inclusions are more transparent than steel and so appear as darker regions on the negative and as light regions on the prints.

The problem which has faced engineers ever since

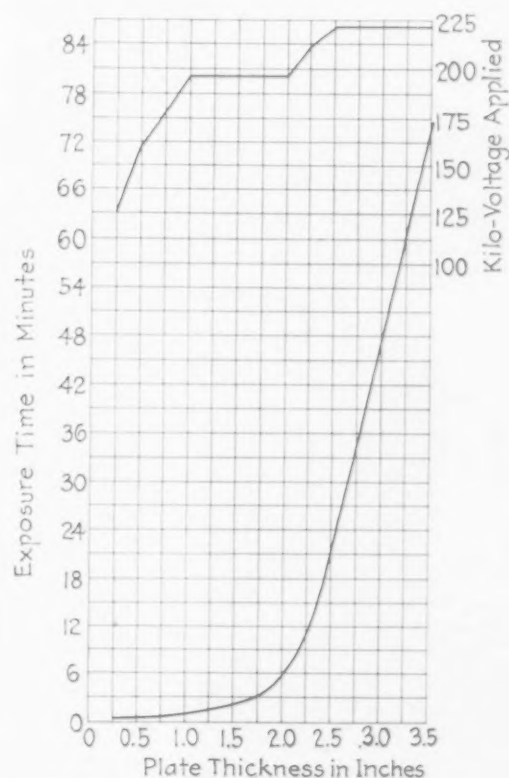


Fig. 1.—The curve of penetration of X-rays in steel rises abruptly after a thickness of plate of 2½ in. is reached.

The Trend in Refinery Plants

AS in many other fields, the trend in the design of pressure cracking apparatus is toward higher pressures and temperatures and larger units.

A modern cracking unit such as that now nearing completion at Bayonne, N. J., has a capacity equal to about 20 of the old stills which were in high favor not more than eight or ten years ago. This new unit, which will be capable of handling a charge of between 8000 and 9000 bbl. a day, will require more than 1500 tons of steel in its construction. Because of the high temperatures and pressures at which the plant operates the finest materials and workmanship have entered into the building of the various tanks and towers.

It is a compliment to the steel industry and the steel fabricating art that solid forged and welded vessels such as required in this unit can be made. Welded joints, 100 per cent tested, heat-treated fire box steel shells and forged alloy fittings are some of the features. A further trend in modern cracking unit design is toward more and more automatic operation. All the instruments and controls are brought to one location in the present design, and the temperatures, rate of flow and other variables are governed automatically. But four men are needed in the operation of the entire unit in contrast with perhaps 25 for operating the same capacity in the old type of still.

E. ELLSBERG,
Chief Engineer,
Tide Water Oil Co.

the examination of steel by X-ray was started is found in the increasing difficulty of penetration as the thickness of the steel increases. The curve of penetration rises abruptly as the thickness of the plate exceeds 2 in., and X-ray examination of steel above 3 in. in thickness is impractical at the present time. Fig. 2 gives a typical exposure chart for steel which illustrates this difficulty. In an attempt to find other methods of testing for thickness above 2 in. the Gamma ray test has been developed and it now bids fair to have considerable value in this field.

In the revised boiler code it is stated that vessels of a wall thickness over 2½ in. need not be X-rayed until such time as evidence is submitted that such examination is commercially feasible. In the case of the containers for the Bayonne plant the wall thickness is well under this limit and every inch of weld was X-ray tested. The bubble tower is made of fire-box steel with a wall thickness of 1¼-in. and with heads 2 in. thick. The separator is made of 1¾-in. plate and the flash tower and horizontal accumulator are made of ½-in. plate.

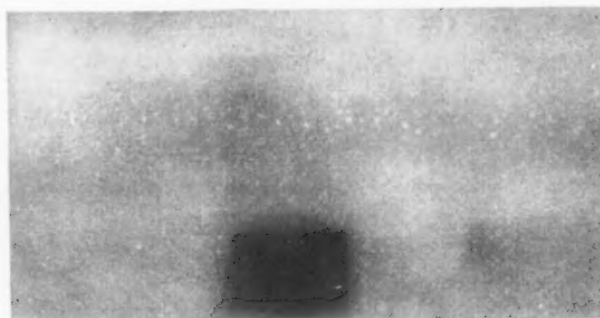
Specifications require that Class I fusion-welded



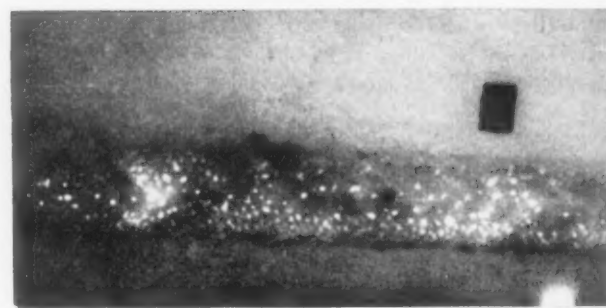
A



C



B



D

Fig. 2.—(A) In a perfect weld there should be no difference in density between the plate and the weld. (B) This shows moderate porosity in the deposited metal. (C) A weld of this sort is immediately rejected on important work. (D) The marker indicates the exact location of this poor weld so that it may be machined out and rewelded.

vessels be stress-relieved by heating uniformly to at least 1100 deg. F. and up to 1200 deg. or higher if this can be done without destruction. From this it will be seen that stress-relieving of the 90-ft. bubble tower requires unusual equipment. The Babcock & Wilcox Co. recently completed a new annealing furnace at Barberton, 60 ft. long and 15 ft. or more in width and height. This furnace, which is shown at Fig. 5, is close to the largest furnace of its kind ever

built. The bubble tower and the other long tanks were annealed in it by placing one end at a time in the furnace and building a special seal around the tank at the furnace entrance.

Both X-Ray and Electro-Magnetic Tests Used

The procedure in welding these large tanks for Bayonne conformed exactly with the specifications of the boiler code but also included many additional

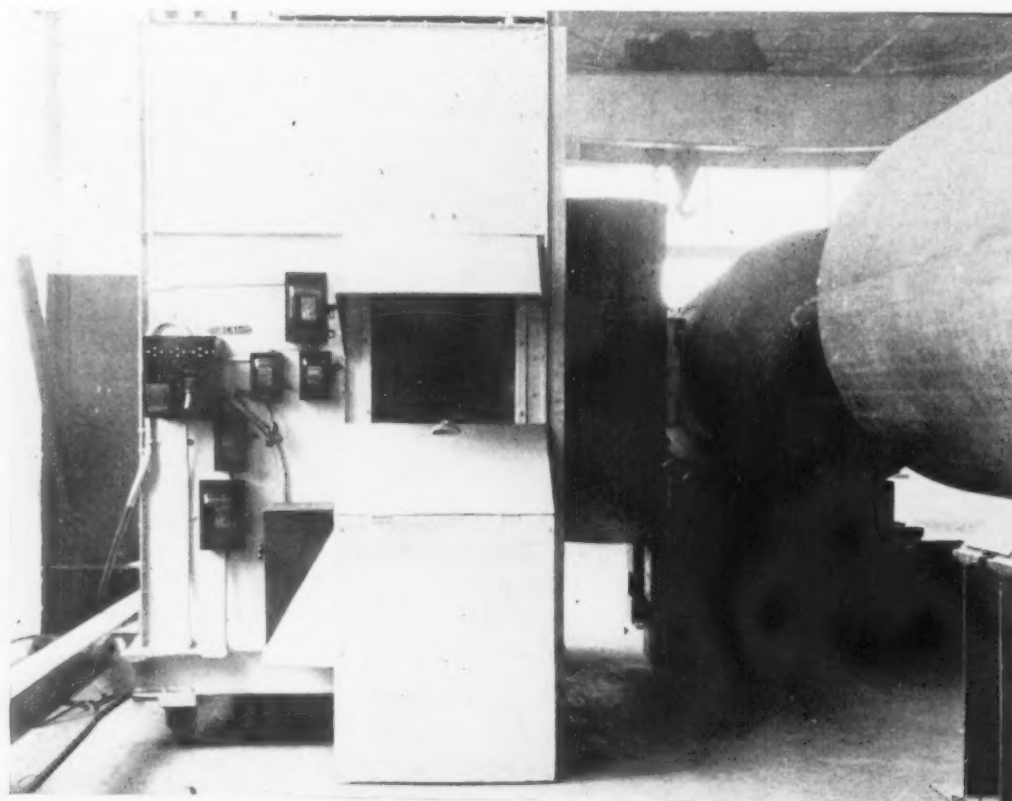


FIG. 4.—For lighter tanks roller supports are used for circumferential examination to facilitate rotation of the tank. In this case a weld joining a standard dished head on a drum is being X-rayed.

safeguards not specifically stipulated in that code.

A brief description of the welding and testing of the bubble tower will give some idea of the exceptional care employed. The X-ray equipment was furnished by the St. John X-Ray Service Corp. and is thought to be the first of its kind to be set up in this country for routine factory inspection. The equipment, which is housed in a portable room, has been described in detail in previous articles. Briefly, it uses an X-ray tube operating at 220,000 volts and photographs an 18-in. section of the weld at each exposure. A system of markers was used so that each exposure may be definitely identified with its location on the vessel.

On the bubble tower it was found that satisfactory exposures could be made at 160,000 volts in about 2 min. Under such conditions cavities having a depth of 2 per cent of the wall thickness were readily detected. In the case of longitudinal joints of the bubble tower the container was held stationary with the joint directly in front of the X-ray machine and the machine was then moved along from one end of the joint to the other, stopping at close intervals to make a series of exposures which overlapped

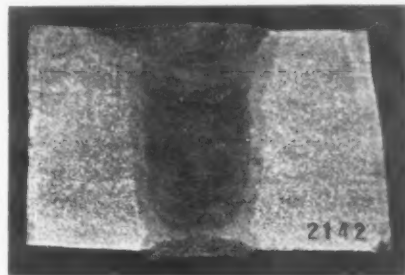


FIG. 3.—This shows the method of building up the welds used for the Bayonne unit tanks. The plate edges are machined to form before the welding is started.

slightly. With the circumferential joints it was necessary to rotate the container about its axis between exposures.

The cost of this X-ray examination was estimated at about 30c. per foot of welded seam. In addition to the X-ray test, electro-magnetic tests were made with a Sperry electro-magnetic testing machine. In this test an electric current was passed through the weld to set up a magnetic field the form of which

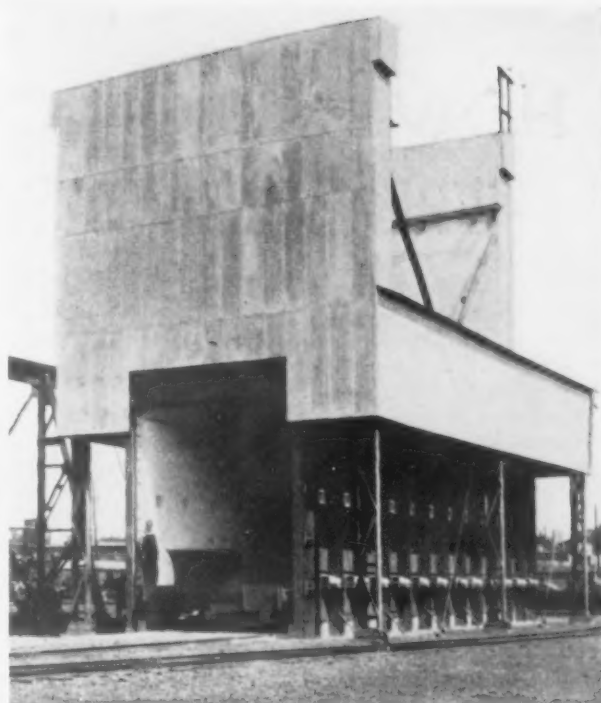


Fig. 5.—This car-type annealing furnace at Barberton, Ohio, is said to be the second largest of its kind in the country.

would be affected by any defects in the weld. The variations were picked up by a balanced magnetic coil and transmitted through suitable relays to the recording instruments.

Many tests of specimen welds and of the plate itself were made in connection with the work. One of these was a series of fatigue tests in which water under high pressure was alternately admitted to and exhausted from the welded test vessel. In all cases properly made welds were shown to be equal to or better than the plate metal in tensile strength, shock resistance, ductility and the ability to withstand repeated stress.

In a report issued by the engineering department of Babcock & Wilcox Co. certain details were given covering testing of these large tanks and some of

(Concluded on page 1412)

FIG. 6.—Extension pieces are welded on at the ends of longitudinal joints to give test specimens of the actual welding procedure.



HOW CARBON CONTENT AND HEAT TREATMENT CAN AFFECT WEAR RESISTANCE

By SAMUEL J. ROSENBERG

Associate Metallurgist,
United States Bureau of Standards

HOW will it wear?" is a question frequently asked with respect to the probable life and service of a new alloy or of an old alloy applied to a new type of service. This apparently simple question is in reality a complex problem and is all too rarely susceptible of a definite answer in the absence of actual service records.

Although experience is a safe guide in the selection of materials to resist wear, it is at best a laborious and time-consuming process of accumulating data. Laboratory tests, when properly made and conservatively interpreted, can be substituted to some extent for service tests and permit the accumulation of data from which can be made predictions of the suitability

of metals for certain service conditions requiring resistance to wear.

Two Types of Wear Studied

The United States Bureau of Standards has recently studied the effect of carbon content and heat treatment upon the wear resistance of steels when subjected to two types of wear. These two types were those produced by the Brinell sand-abrasion testing machine and the Amsler wear-testing machine.

In the Brinell machine a specimen is subjected to the abrasive action of fine, standardized sand drawn across the specimen under the pressure of a slowly revolving soft iron disk. Wear is measured by the loss in weight of the specimen. This test is suitable for

the determination of the wear resistance of metals when subjected to the sliding abrasive action of sand under relatively light pressures.

In the Amsler machine a specimen, in the form of a 2-in. disk, is rotated under heavy pressure against an arbitrarily selected "standard" specimen of the same shape and size. The two disks rotate at differential speeds so as to give a small amount of sliding between the specimens. A measuring device on the machine is used for calculating the amount of work done in overcoming the friction between the two specimens. Wear is measured by the loss in weight of the specimen per unit of work. This test is suitable for the determination of the wear resistance of metals when subjected to combined sliding and rolling friction under relatively heavy pressures against another metal.

Results from the Brinell Machine

The effect of carbon content and heat treatment on the resistance of steels to abrasion by sand when tested in the Brinell machine is shown in Fig. 1. The hardness values of the steels tested are also given. In this type of test there seems to be a fairly definite relationship between wear resistance and hardness. Tempering a hardened steel resulted in a gradual decrease in the wear resistance. It may be stated, then, that in the case of plain carbon steels, when subjected to the sliding abrasive action of sand under relatively light pressures, any heat treatment conducive to higher hardness will give increased resistance to wear.

In a series of steels of increasing carbon content and of any given condition of heat treatment, that is, normalized, annealed or hardened, resistance to wear increases noticeably with

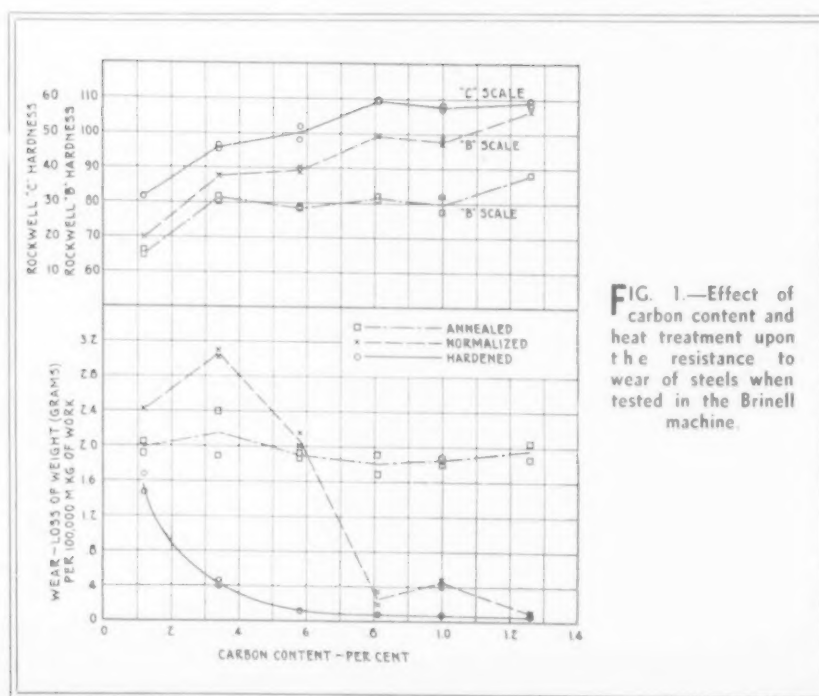


FIG. 1.—Effect of carbon content and heat treatment upon the resistance to wear of steels when tested in the Brinell machine.

TWO types of wear were studied by the author: Wear caused by the sliding abrasive action of sand under relatively light pressure; and wear under combined sliding and rolling friction under heavy pressures or metal-to-metal wear.

Under the sliding abrasive action, the structure of plain carbon steels affects the wear in the same fashion as it affects the hardness. Hardness is a safe guide in the prediction of wear resistance—the harder the steel, the greater its wear resistance.

In metal-to-metal wear, the microstructure of the steels plays a very important part. Although hardness is a fairly useful criterion of wear resistance, changes in structure affect markedly the wear resistance despite relatively small changes in hardness.

The article is published with the approval of the director of the Bureau of Standards.

increase in carbon in the lower range of carbon content. In the higher ranges of carbon content, however, above about 0.5 per cent carbon in hardened and above about 0.7 per cent carbon in normalized or annealed steels, the resistance to wear ceases to increase so rapidly, indeed becoming roughly constant up to 1.3 per cent carbon.

What the Amsler Machine Showed

The effect of carbon content and heat treatment on the resistance to metal-to-metal wear under heavy pressures as determined in the Amsler machine is shown in Fig. 2. In this type of test, the dependence of the wear resistance upon hardness is not nearly so marked as in the type of wear studied with the Brinell machine. The carbon content apparently has little effect upon the wear of the annealed steels. The wear of the low-carbon normalized steels was even greater than that of the annealed steels of similar carbon content, but with increasing carbon content the wear rate of the normalized steels decreased rapidly, approaching, in the high-carbon range, the relatively high wear resistance of the hardened steels.

The wear of the hardened steels (all hardened steels were quenched in water and tempered at 500 deg. F.) decreased rapidly and regularly with increasing carbon content in the lower ranges of carbon. In the higher ranges, however, above approximately 0.5 per cent carbon, increased carbon did not materially affect the wear resistance. All of the steels tested in the Amsler machine were tested against an arbitrarily adopted "standard" steel. This "standard" was an 0.81 per cent carbon steel normalized at 1490 deg. F., water quenched from 1420 deg., and tempered at 500 deg.

In these tests it was rather sur-

prising to note that the low-carbon normalized steels lost more weight than the same steels when in the softer annealed condition. It was also rather surprising that the high-carbon normalized steels showed such an increase in wear resistance, approaching, as they did, the wear resistance of the hardened steels.

Explanation of the Results

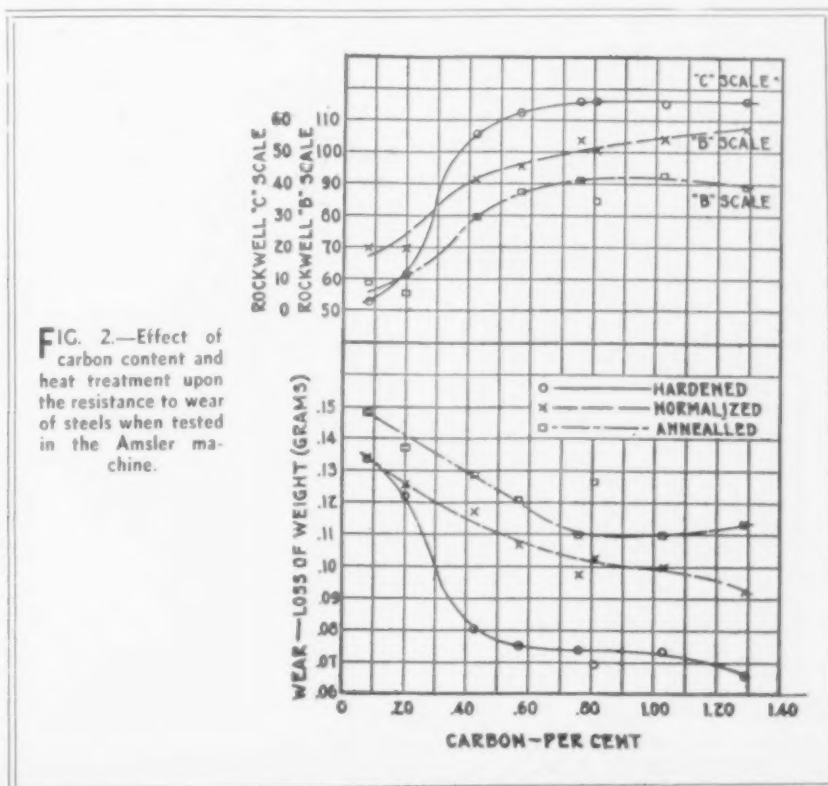
A correlation of the microstructure, hardness and wear resistance explained these results and shed some light upon the effect of the microstructure upon the wear resistance of carbon steels. In the resistance of carbon steels to wear under the sliding abrasive action of sand under

relatively light pressures, the structure of the steels affects the wear in the same fashion as it affects the hardness. That is, in this special type of wear, the hardness is a safe guide in the prediction of the wear resistance of carbon steels—the harder the steel, the greater is its wear resistance.

In the resistance of carbon steels to metal-to-metal wear under combined sliding and rolling friction under heavy pressures, however, the microstructure of the steels plays a very important part. Although the hardness of the steels is, in a somewhat general fashion, a fairly useful criterion of the wear resistance, consideration must be given to changes in structure which, although causing relatively small changes in the hardness of the steels, affects markedly the wear resistance.

It was found that the presence of free ferrite or of free cementite (as spheroids) was detrimental to the wear resistance. Free cementite occurring as thin continuous envelopes was found to increase the wear resistance. A structure of lamellar pearlite was found to be quite resistant to wear, while a martensitic, or rather a martensitic-troostitic structure, was the most favorable for resisting wear of the type studied.

Too much emphasis cannot be placed upon the fact that these wear test results should be used to predict the behavior of metals in service only when the type of service simulates the conditions of test described.



Battledeck Flooring Fire Tests Reported

A BARE steel floor of battledeck construction will perform satisfactorily in resisting complete burn-out of the average office or hotel room, according to F. H. Frankland, director of engineering service, American Institute of Steel Construction, in the preliminary report of the first of a series of tests being conducted by the Bureau of Standards, Washington, in cooperation with the institute.

The first five of a series of 16 fire tests have been completed; in this group the fire exposure was from above the floor. Tests in the second and third divisions will be with fire exposure from beneath the floor; in the third division, comprising the last three tests, a hose stream will be applied to the ceiling after the period of fire exposure.

The test panels are 18 ft. long and 13½ ft. wide, with 4 or 5-in. standard I-beams, spaced approximately on 24-in. centers and spanning from girder to girder. The steel flooring plates, ¼ in. thick and 23½ in. wide, are continuous, with edges welded together. They are also welded to the top flange of the beams, making a built-up T-section with the plates acting as the upper flange and the beam forming the vertical part of the T.

Each test panel is erected within a furnace built for the purpose of making these tests. The floor is supported during the test by a heavy steel restraining frame which is incorporated in the furnace construction. Connections between frame and test floor can be arranged to give full restraint to the construction during the test or to provide the beams with end clearance for expansion. The floor beams span the full 18-ft. length of the panel except in certain tests where they are supported on a girder at an intermediate point to introduce details of continuity and also details of fireproofing required for the girder.

No floor finish was applied in the first test, the bare plates being loaded with combustible materials amounting to 10 lb. per sq. ft. of floor area, plus pig iron to bring the total load to 105 lb. per sq. ft. In this test, the floor was fully restrained around its edges. A maximum room temperature of 1320 deg. F. was reached 30 min. after the debris was ignited. The maximum deflection of the five interior beams at the center of the span was 2.69 in. 3 hr. after the fire. The maximum temperature of the floor plates was 828 deg. F., reached after 50 min.; that of the floor beams at the center of the panel was 536 deg. F. after 3 hr. 40 min. As was expected the temperature in

▲ ▲ ▲
BATTLEDECK floor panel loaded with pig iron and combustible material prior to fire test.
▼ ▼ ▼



the steel bore a definite relation to the room temperatures.

Various floor finishes, including battleship linoleum and special insulating concrete mixtures, were used in the other tests of the first division. Loadings were varied and the amount of combustible material was increased, tests being arranged with combustible loads up to 40 lb. per sq. ft.

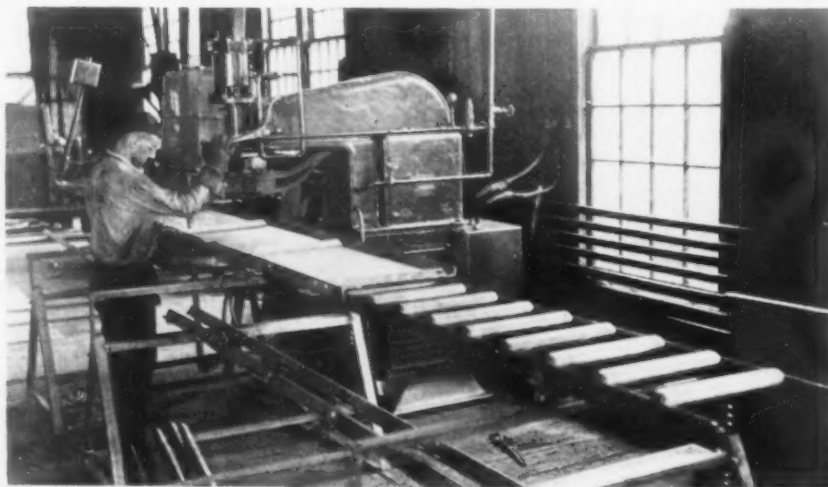
In the succeeding tests, fire ex-

posure from below will be obtained with a gas furnace using 48 horizontal venturi-tube induction burners. The ceiling protection will vary for the different tests from a ¾-in. thickness of plaster on metal lath to a ½-in. thickness of plaster on a 2-in. precast gypsum ceiling tile suspended from the lower flange of the beams. Various floor finishes will be laid on the different panels also.

Conveyor Facilitates Sheet Welding

SHEET-METAL welding is speeded at the Ellwood City, Pa., plant of the Mathews Conveyor Co. by means of this conveyor unit which the company developed for its own use. A section of roller conveyor is mounted on ball bearing wheels that run in channels on the top of metal horses

that are adjustable for height. The sheets to be welded are placed on the rollers and easily positioned by moving to right or left along the conveyor bed, or to front or rear by rolling the entire conveyor on its tracks. Marked economies are said to result from its use.





PRESIDENT WICKWIRE ready for his favorite recreation of polo.

INDUSTRY SHOULD PROMOTE THE FARM HOME

INTERVIEW with the head of the wire and wire products business of Wickwire Brothers, Inc., (which has a self-contained plant including the making of its own steel, at Cortland, N. Y.), touches in part on the plight of the railroads and also on simplification in manufacture.

AN item of industrial, as well as sociological, importance that still needs stressing is the passing of the small farm as a home. Such is the view of Charles C. Wickwire, president of Wickwire Brothers, Inc., Cortland, N. Y. In an interview obtained at the works at Cortland several weeks ago by THE IRON AGE, Mr. Wickwire deplored the fact that this large lesson of the depression had seemingly not been learned. By and large, he said, factory workers count unduly on advantages of living in relatively crowded centers. Yet, in his opinion, more of happiness and a closer approach to independence is to be gained through the farm home.

He is not considering the farm as primarily a money maker but the farm to be lived on by the industrial worker. The depression has served to emphasize the good fortune of the one who had at least his own soil as the basis for subsistence but it has not widely put the spotlight on the small farm as a valuable place for useful work at a time when industry's demands are low. With so much propaganda for the shortened work-week, and easy means of transportation readily within the means of the wage earner, the surprise is that no particular drift is discernible toward ownerships or tenancies of land lying short distances outside industrial communities.

Mr. Wickwire sees no way of fore-

ing a return to the soil but he is sanguine that renewed enhanced respect for farming is coming. He intimated that the local banker is ready to assist in farm home buying. It behooves those in a position to do so, he urged, to do their part on every good opportunity to point out the possibilities of modern farm living.

The developments in electric power distribution, said he, are having a decentralizing influence on industry. By the same token certain of the so-called advantages of town and city dwellings are dwarfed in terms of the conveniences obtainable in the isolated home. "Substantially all of the alleged attractions of the city," he added, "can be enjoyed at will, thanks to the motor car. House water supply, available along with modern plumbing equipment, electricity for the water system, for lighting purposes, for sweepers, washing machines and other household apparatus, also the radio and the automobile, not to forget portable gas for the kitchen—all make the farm home virtually a part of the town and yet far above it when it comes to securing dividends from the soil and from enjoyment of the great outdoors."

Mr. Wickwire delivered himself also on the plight of the railroads. His conviction is strong that the railroads should have adequate relief from competitive services. Apart from the question of higher or lower wages, something should be done about the

relatively low taxation and correspondingly low overhead charges which motor truck and motor bus lines get away with. He has no special cure but believes legislators ought soon to take cognizance of the maladjustment.

As a manufacturer of wire cloth and poultry netting, he is an ardent advocate of the simplification and standardization program that has been pushed by the Department of Commerce. It makes it unnecessary of course for the distributor and retail hardware trade to carry numerous lines for which there is very little demand, and the manufacturers welcome this reduction in variety as an item in keeping costs low.

But of course, simplification is not calculated of itself to focus any stronger than formerly on quality, and quality of product, without idly using the word, is regarded by Mr. Wickwire as a major objective in manufacture. The reputation built up in the 58 years the Wickwire Brothers institution has been in existence is a factor which the management does not lose sight of in all the keenness of competition which has marked the wire as well as other businesses.

The result has been that metallurgical developments are closely watched, thus to keep up quality of the steel as it is teemed from the company's open-hearth furnaces and to supply such products as copper

(Concluded on page 1410)



SOME FACTORS AFFECTING OPEN-HEARTH OPERATING ECONOMIES

ATREATMENT of the general principles underlying the conversion of metallic charges into basic open-hearth ingots, covering operating economies, featured a paper by Clarence D. King, chairman, Open-Hearth Committee, United States

Steel Corp., New York, read before the American Iron and Steel Institute recently. A brief abstract of Mr. King's voluminous paper, together with the pertinent discussion by Vincent J. Pazzetti of the Bethlehem Steel Co., follows:

Abstract of Mr. King's Paper

INTENSIVE study of open-hearth operations has led to notable improvements in production rates, fuel consumption, furnace life, and in those costs for which the open-hearth operator is normally held responsible. Since he is furnished raw materials, in quality and prices over which he has no control, generally, in his opinion the ultimate cost of the net metallic mixture is fixed and his criterion of the performance of the open-hearth is the cost above net metallic mixture.

However, if this standard alone is used to determine the efficiency of the open-hearth, the losses involved in conversion are entirely disregarded and may result at times in increased ingot costs, in spite of decreased cost above net metal. The term "Cost Above Net Metal" embraces all costs incidental to the conversion of any metallic mixture into steel ingots, but excludes the cost of ferroalloys and the monetary losses involved in the conversion of the charge into ingots.

The latter losses would include metalloids eliminated; the metallics lost in slag, in slag pockets, checker chambers, waste gases, etc.; and finally includes losses of material incidental to handling, etc.

Monetary losses represent as much as 40 per cent of the cost above net metal and constitute an important factor in the total ingot cost. Such losses will be represented by the production of scrap, as well as irrecoverable losses, and appreciably affect the ingot yield. Since the cost above net metal ordinarily constitutes only from 15 to 30 per cent of the total ingot cost, it is obvious that any appreciable decrease in yield, in turn affecting the cost of the gross and net metallic mixture, may offset measurable savings in the cost above net metal.

[Dividing the discussion among Hot-Metal Plants, Cold-Metal Plants and Duplex Plants, the author devotes most of his discussion to the first, as by far of the greatest importance. He takes up such matters as:

Influence of Inaccurate Weighing;
Iron Scrap and Iron Skull Production;
Pit Scrap, including Steel Skulls;
Condemned Ingots, and Ingot Butts.
(Under the general heading "Loss," he discusses:

Recovery of Open-Hearth Slag;
Free Metallic Iron in Open-Hearth Slags;
Iron Lost in Checker Chamber Dust.

[By decreasing the amount of scrap produced, and converting some losses into scrap credits, he shows a possible increase of ingot yield from the 87.99 per cent of Table II to 89.27 per cent. On an assumed basis of costs, this reduces the ingot cost from \$24.278 to \$23.955 a gross ton. Of this 32.3c. gain, 25.8c. comes from "savings due to net metallic mixture" and 6.5c. from "savings due to cost above net metal."

[Then the author takes up the influence of changes in percentages of iron and scrap, in the charge, upon operating economies. He finds a consistent loss in ingot yield as the percentage of pig iron in the charge is increased (Table III). Differences in type of scrap were found to exert an influence on operating economies. Much of the results of calculations are shown in the five tables herewith, selected from the 24 in the paper.]

Among the Conclusions

Excessive scrap production has a material influence on the final ingot

Table I—Losses in Components of Basic Open-Hearth Charge

Type of Losses	Fe in Ore, Scale, Etc.	Hot Metal or Pig Iron	Steel Scrap	Limestone	Dolomite	Fluorspar
Metalloid losses:						
Carbon	4.12	4.16	0.06	...	...	...
Silicon	1.12	1.12	...	...	...	...
Manganese	1.44	1.44	0.29	...	...	...
Phosphorus	0.185	0.185	...	...	...	...
Iron loss in slag (Fe to Si ratio)	10.67	2.672	0.09	0.74	1.46	4.24
Spillage, oxides, foreign losses	0.22	0.50	0.40	...	...	...
Miscellaneous losses	0.75	0.75	0.75	...	...	...
Total losses	11.42	10.227	1.59	0.74	1.46	4.24

Table II—Calculation of Basic Open-Hearth Yields

Materials	Materials Used Per Cent of Metallic Charge	Losses in Charge Components, Per Cent	Loss Per Cent of Total Metallic Charge
Fe in ore, scale, etc.	5.4	11.42	0.617
Hot metal and pig iron	56.3	10.227	5.758
Steel scrap	37.8	1.59	0.601
Additions	0.5	25.00	0.125
Total metallic charge	100.0	...	7.101
Limestone	6.9	0.74	0.051
Dolomite	2.7	1.46	0.039
Fluorspar	0.35	4.24	0.015
Total losses	...	...	7.206
Scrap recovered:			
Miscellaneous scrap	...	...	3.79
Condemned ingots and ingot butts	...	...	1.01
Total scrap	...	...	4.80
Total net loss and scrap	...	...	12.01
Ingot yield	...	...	87.99
Total	...	...	100.00

cost and at times may warrant measures which may increase the cost above net metal, but result in a lower cost of net metallic mixture and, therefore, result in reducing the total ingot cost.

In investigations of this character it is necessary to determine ingot yields accurately when using different types of scrap, since a large difference in yield may offset apparently attractive savings through existing differentials between pig iron and scrap. Occasionally, there are times when an increased cost above net metal, obtained by changes in charge, may be offset by a decreased net metallic mixture cost, resulting in a reduction in ingot cost.

Because of the many variables involved, no conclusions can be drawn which will hold true of all plants. But it is obvious that the influence of the metallic charge on open-hearth operating economies is of such importance that comprehensive studies made along these lines will result in a more intimate and exact knowledge, and ultimately will produce material savings.

Other Factors Equally Important

DISCUSSING the paper, Vincent J. Pazzetti, of the Saucon open-hearth plant, Bethlehem Steel Co., contributed the following:

Mr. King clearly states that his calculations apply to the cost of ingots only, and that the open-hearth operator rarely has any choice as to the class or proportions of the materials he is called upon to use. But the operator cannot be content with merely taking what is given to him, cut down his scrap losses where he can, sell the maximum amount of slag to the blast furnaces, keep his cost above net materials at a minimum, and be satisfied with the resulting ingot cost.

He must be just as much interested in high yields from ingots to finished mill products as he is in low ingot costs. He must be interested not only in how good his costs are, but in how good his steel is. With this in mind, he often is faced with the necessity of sacrificing cost above net materials, yield and ingot costs, for the sake of making steel that will result in the plant shipping the maximum possible quantity of salable products from the raw materials available.

Two open-hearth plants with similar metallic charges, but with different grades of products, will not obtain similar ingot costs if the performance of the steel in the mills is taken into consideration. Even with equal grades of steel, differences in the shape of the finished product, which result in different degrees of punishment in the rolls, will result in different mill yields.

Hot tops may have to be resorted to, increased alloys may be necessary,

Table III—Relation Between Basic Open-Hearth Yields and Percentages of Iron Charged, Based on Equal Conditions

Percentage iron charged.....	40.4	46.6	53.1	57.5
Tons materials required per 100-ton heat.....	116.107	111.062	112.410	113.288
Ingot yield.....	90.82	90.04	88.96	88.27
Loss.....	4.05	4.47	5.13	5.56
Total scrap produced.....	5.13	5.49	5.91	6.17
Total.....	100.00	100.00	100.00	100.00
Details of scrap produced:				
Iron scrap and iron skulls.....	0.20	0.23	0.27	0.29
Pit scrap and steel skulls.....	2.75	2.75	2.75	2.75
Ingot butts and condemned ingots.....	1.00	1.00	1.00	1.00
Metallies in slag consumed at blast furnaces.....	1.18	1.51	1.89	2.13
Total.....	5.13	5.49	5.91	6.17

Table IV—Comparison of Time Per Heat Required for Charging Different Types of Scrap

Class of Scrap Charged	Average Weight per Box	Boxes Required	Cold Iron, Ore, Etc.	Total Boxes	Charging Time, Min.
Rail and billet.....	4,100 lb.	25	32	57	30.0
Slab and bloomer.....	3,200	32	32	64	34.2
Merchant mill.....	2,400	43	32	75	40.8
Cobbles—scrap shears.....	2,400	43	32	75	40.8
Open-hearth pit scrap.....	2,200	47	32	79	43.2
Turnings.....	1,900	54	32	86	47.5
Tin mill sheet.....	1,500	69	32	101	56.4
Plate mill.....	1,400	74	32	106	59.4
Miscellaneous.....	1,400	74	32	106	59.4
Wire.....	1,300	80	32	112	63.0
Sheet mill sheet.....	1,200	86	32	118	66.6

larger slag volumes for better elimination of impurities, any number of things may have to be added as penalties in the open-hearth, for the sake of better final mill costs. And all of the reasons for, and results of, such extraordinary items are just as important to the open-hearth operator as any other part of his operation.

From this standpoint, therefore, the calculations and data in this paper

constitute only the first chapter in the complete story. For every change resulting in lower open-hearth costs, the calculations must be continued to develop their effect on finished material costs. From such a follow-up has developed largely the progress made in at least two of the outstanding open-hearth developments in recent years—combustion control and slag control.

Table V—Comparative Data for Open-Hearth Furnaces Charged with Different Types Steel Scrap

	Crop Scrap	Bundled Sheet Scrap	Compressed Sheet Scrap
Time of heats—charge to tap.....	8 hr. 16 min.	8 hr. 25 min.	7 hr. 43 min.
Bottom repairs, bottom making, etc.	40 min.	1 hr. 8 min.	55 min.
Gross time per heat, including difference in bottom delays, etc.....	8 hr. 16 min.	8 hr. 33 min.	7 hr. 58 min.
Gross ton ingots and scrap produced per heat.....	74.12	68.64	69.79
Tons an hour on gross time of heat.....	8.97	7.65	8.76
Per cent decrease in hourly output.....	100	14.7	2.4
Materials charged, lb.:			
Total iron.....	85,565	87,250	86,820
Steel scrap.....	85,320	85,280	85,360
Iron in ore, scale, etc.....	7,560	3,970	880
Manganese (pure).....	585	632	656
Silicon (pure).....	60	40	75
Limestone.....	17,350	16,740	16,860
Dolomite.....	5,200	5,200	5,200
Gallons fuel oil per ton ingots.....	30.6	36.7	31.6
Time loading (per heat) cranes.....	31 min.	1 hr. 14 min.	1 hr. 3 min.
Time loading (per heat) stockers.....	1 hr. 9 min.	3 hr. 24 min.	1 hr. 49 min.
Time charging (per heat).....	16 min.	57 min.	1 hr. 4 min.
Ingot yield and scrap produced, per cent.....	92.74	86.65	89.94
Loss, per cent.....	7.26	13.35	10.06

Undercurrent of Optimism at Meeting of National Founders' Association

ECONOMIC readjustments and related problems arising out of the depression were uppermost in the discussions at the thirty-fifth annual convention of the National Founders Association, Hotel Astor, New York, Nov. 18 and 19. Not only were the members of this organization deeply concerned in the purely business aspects of the present situation, but also in possible legislative action, particularly in the next session of Congress.

Throughout the sessions there was an undercurrent of optimism that the worst of the depression is over and that a recovery is already under way.

The association reelected President S. Wells Utley, Detroit, and other officers, but selected new district committeemen whose names are given in an adjoining column.

Mr. Utley, in his opening address to the convention, reviewed the economic history of the United States, with interesting details of past periods of depression, adding the thought that, severe as is the present depression, there is nothing so dismal today as was the outlook at the depth of past severe depressions.

Widespread Effort to Ameliorate Depression's Harmful Influences

"I believe," said Mr. Utley, "it is safe to say that the present depression has had one outstanding characteristic which has differentiated it from all that have preceded it, namely, a definite, widespread attempt to ameliorate so far as possible its harmful influence upon those most seriously affected. Never before has industry of all kinds in all parts of the country made such an effort to prevent unemployment by providing jobs for the largest possible number of men, even at the cost in some instances of maximum efficiency; never before has such a determined effort been made to maintain wages until the time when the decrease in commodity prices had resulted in an actual increase in real wages; never before has the creditor as a class been so slow to close out the debtor, nor has he cooperated to such an extent in endeavoring to aid him in working himself out of his unfortunate predicament."

Mr. Utley called attention to the possible aftermath of this depression,

which may include demands for social services such as unemployment insurance and old-age pensions, which "plausible though they may sound, desirable though they may seem from the standpoint of the individual, are all based on the philosophy that the world owes each of us a living."

On the subject of unemployment insurance, Mt. Utley argued that the business corporation is powerless to control employment and, like its employees, is out of a job when customers refuse to buy.

"How can we stabilize employment in industry," he said, "unless we first stabilize the customer's buying? So long as a man continues to speculate, to overbuy, to live beyond his income and to the limit of his credit when he is happy and buoyant, with the result that he must underbuy during the succeeding period when he is paying off his debts, I fail to see how we can hope to have steady buying and hence steady employment."

Compulsory Unemployment Insurance Believed to Be Dangerous

Unemployment insurance was also dealt with extensively in the address by James A. Emery of Washington, counsel of the association, who declared that unemployment is not subject to the control of the individual manufacturer. He said that public compulsory unemployment insurance embodies a dangerous policy because such insurance cannot be subjected to actuarial tests. Mr. Emery dwelt at length on the various types of legislation of interest to business that will come before the next session of Congress.

The findings of the National In-

dustrial Conference Board on the subject of unemployment insurance were presented by F. Spencer Baldwin, director of research of that organization, and are published on another page of this issue. The National Industrial Conference Board has conducted a world-wide study of this question, and its conclusions are that such schemes do not offer a permanent remedy for unemployment.

A. E. McClintock, commissioner of the association, reported that the foundry industry has been free from strikes in the past year. He declared, however, that "a wave of radicalism is fairly sure to follow any turn for the better in the business situation," and he warned the members to be prepared for combative action.

Work in Industrial Education Developing Better Relationship

Industrial education has been prominent in the work of the National Founders Association during the past year, and a series of regional meetings has been held to educate plant foremen as to the principles sponsored by the association for the development of a higher type of relationship between men and management. The results which can be achieved by the more intelligent handling of workmen were emphasized by Louis W. Olson, Ohio Brass Co., Mansfield, Ohio, who related some of the results in his own plant. In safety work, for example, the Ohio Brass Co. made the unique record of having gone through an entire year up to Nov. 6 last without a lost-time accident in a group of employees ranging from 640 to 700, its operations including hot galvanizing, drop forging, punch press work, general machine work in brass and iron, hydraulic press work, minor construction, yard and truck work and loading and unloading of cars. The company's malleable foundry, including the galvanizing department, has operated more than two years without a lost-time accident.

Mr. Olson stressed the fact that the teaching of safety in the plant develops a spirit of carefulness among workers which carries through their non-working hours. During the past year, there were only three lost-time accidents to Ohio Brass Co. employees outside of working hours.



Mr. Olson also made a point of results that have been achieved in educating company workers to a sense of cleanliness and order, saying that there had been an appreciable reduction in the amount of janitor work necessary. Scrap paper and other waste is placed in receptacles instead of being thrown on the floor or in the plant yard. By teaching safety and order to employees, any company, he said, paves the way for other activities which would bring about waste elimination, punctuality and similar desirable expressions of interest in improved working conditions.

Men in the Ranks Must Have Opportunity for Advancement

A. D. Lynch, director of personnel, Ohio Brass Co., followed Mr. Olson with an address on the modern trend in handling people. He stressed the importance of personnel work, stating that the better relations which exist today between management and men should be capitalized, and not exploited. He believed that very effective work could be done at the present time among the skeleton forces now employed in most plants, and that manufacturers need not and should not wait until business is back to normal before beginning such training. He thought that this was the opportune time to build morale among the workers. One method of doing this, Mr. Lynch said, which is sometimes neglected in many organizations, is to foster advancement from the ranks. Occasionally it is necessary to go outside for a man for some specific job, but men who are already in the organization should whenever possible be given the opportunity to advance to better positions.

At the luncheon on Wednesday, an interesting talk on "This Synthetic Age" was delivered by Dr. Gerald Wendt, New York, editor of *Chemical World*, who cited developments in the chemical industries in the past decade as an example of the hazards of industry that come from complete change of products and markets because of new technical discoveries. One of the recent chemical discoveries that he said will have a profound effect upon at least one branch of industry is the discovery of a commercially practicable method of making synthetic rubber, in which the du Pont company has only recently engaged. He cited the changes that have come about through the development of rayon, cellophane and other synthetic products. He predicted a great future development in the chemical industries in the use of wood and petroleum as raw materials.

American Workingman Bearing Up Well in Depression

At the afternoon meeting, Whiting Williams, Cleveland, specialist in personnel work, told a very interesting story of his experiences in various industrial centers where he recently spent some weeks in overalls, mingling with the employed and unemployed. In this investigation Mr. Williams repeated an adventure of some years ago, when he found that he could get closer to the thoughts of the worker by becoming one of them than by seeing them from a distance. Mr. Williams said that his recent experience convinced him that the American workingman is bearing up under the depression with greater fortitude than the average business man. He said that the self-respect

of the American workingman is the salvation of the country. He found that despite the length and seriousness of the depression there is less danger today of extreme labor agitation than during any previous industrial crisis. In his opinion, the only thing that would bring about an industrial revolution would be if men were to go hungry, explaining that men go radical more quickly on empty stomachs.

He cited several reasons for the calmness with which most workers are accepting the present conditions. One is that many men had accumulated savings during the past 10 years which are tiding them over their present difficulties. Another factor is the staggering of work in many plants, which enables a large number to earn something toward the cost of living without digging too deeply into their savings. Still another factor is the very large number of women wage earners; the woman who works very often is largely responsible for maintaining the morale of the family life. Many men, stated Mr. Williams, have taken up small farms and thus are eking out a living from the land. The automobile has helped men to get away from the crowded industrial centers into the farming communities, where many of them have rented abandoned farms until such time as



Officers and Committeemen of the National Founders' Association

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Unemployment Insurance a Palliative Not a Cure, Says Conference Board

THE National Industrial Conference Board, Inc., has completed a world-wide survey of unemployment and unemployment insurance, its findings to be shortly published in book form. A summary of the report was presented at the meeting last week of the National Founders' Association in New York by F. Spencer Baldwin, director of research of the board. The board's general conclusions were stated as follows:

"The problem of unemployment should be considered first from the viewpoint of prevention, or reducing the contingency to its lowest possible terms, and, second, from the viewpoint of relief, or mitigating the distress that results because complete prevention proves impossible. It should be obvious that relief is only a palliative and not a solution of the problem.

"Unemployment benefits and insurance schemes are urged as measures for curing the economic malady of unemployment, but clearly, unless coupled with other measures for preventing unemployment or reducing its volume, such schemes offer only temporary relief and not a permanent remedy."

Compulsory Public Unemployment Insurance

"In several European countries, notably Great Britain and Germany, and in the State of Queensland, Australia," the report says, "compulsory unemployment insurance systems under public control have been established. The first British law enacted in 1911, applying to a limited number of specified industries, had promising results for several years, under conditions that were favorable to its success, but the more general law adopted in 1920 has never been wholly satisfactory in operation and in recent years has given rise to various fiscal difficulties. The system was not designed to meet conditions involving percentages of unemployment so high as have prevailed in Great Britain constantly since 1921, and consequently it has been kept in operation only by large

and increasing advances from the exchequer, which have been reflected in increased tax levies and budgetary deficits. The experience of Germany with emergency plans between the end of the World War and 1927, and with the general unemployment insurance law since the latter year, has been similar in many ways to that of Great Britain, in spite of efforts to frame the law in such a manner as to avoid the defects of the British system.

"The unexpectedly heavy and constantly increasing burden of unemployment, especially since the latter part of 1929, has imposed severe strains upon all compulsory systems. In some instances, as in Great Britain, the result has been to force extension of the scope of the law far beyond proper insurance limits. In other cases enormous expenditures have been made under special emergency measures. In certain countries both tendencies have been at work. Under the first course of action mere charity relief is superimposed upon insurance, and the insurance system degenerates into the dole. Under the second course the basic character of the insurance system is better preserved, but a huge burden of unemployment relief is thrown upon the public. In the second case, also, the State has been obliged to meet large emergency deficits in the accounts of the regular insurance system. In either event the governments involved have been forced to insure enormous unexpected expenditures, and often to increase their national debt greatly for these purposes.

Placement Systems, Public Works and Other Measures

"State employment or placement systems, public works and other devices for preventing or reducing unemployment have been tried in many countries, often in combination with unemployment insurance systems. Placement systems appear to be almost imperative, but they have become involved with other govern-

mental undertakings and have not been so effective as their advocates expected. Public works and other measures for furnishing employment have afforded some temporary relief, but they have shown little indication of affording an adequate solution of the unemployment problem. So far as European experience goes, it would seem that these measures are, at least, only temporary and partial palliatives of unemployment. They do not provide permanent productive work for the surplus labor supply and have little effect in bringing about the absorption or reintegration of this excess labor capacity.

Situation in the United States

"In the United States thus far no legislation providing for unemployment insurance has been enacted. In view of the unsatisfactory results of foreign experiments with public unemployment insurance, it is perhaps fortunate that the United States has not committed itself to any one of the general systems that have been adopted in other countries. What has been done in the United States in the field of unemployment benefits and insurance is confined to the establishment of private plans, sometimes in connection with an arrangement for guaranteeing employment. These private plans, when conducted by trade unions alone or by employers and trade unions jointly, are usually confined to a single occupation or related group of occupations. Company plans controlled wholly or largely by employers are confined to the plants of single companies or to those of groups of companies situated in the same community. In some of the company plans there is considerable participation by employees, as individuals or through shop organizations not affiliated with trade unions. Some of the private plans have produced highly commendable results and are known to be continuing on a sound basis even during the current depression. The newer plans are on a larger scale than the older, and it is reported that many more companies are con-

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ALTHOUGH admitting that it would be unfortunate if the present depression were to pass away without constructive effort toward some form of protection for the unemployed, the National Industrial Conference Board, after an exhaustive study, says that "unemployment insurance must be regarded as a partial palliative of the hardships of unemployment, not as a cure."

Among the objections found to public compulsory unemployment insurance are: It tends to encourage idleness, restricts the mobility and adaptability of labor, offers no inducement to employers to take measures for prevention of unemployment; imposes a heavy burden on industry and government; sets up a burdensome bureaucratic system; destroys growth of private unemployment benefit and insurance plans.

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sidering the establishment of unemployment reserve funds as soon as business conditions make funds available for such a purpose.

"The criticism is heard that the private plans are too few in number and include too small a percentage of the many millions of workers in the United States to have a significant effect on general conditions, or to justify an expectation that they will now or in the near future develop into even a partial solution of the unemployment problem. On the other hand, interest in such plans is rapidly increasing, and it seems probable that they may serve as models for a variety of methods or systems of dealing with unemployment along lines different from those that have produced unfortunate results in foreign countries. It may be possible, through formal or informal organizations, to increase the number and coverage of private plans, within a comparatively brief period, to a point where a general governmental system of benefits or insurance will be seen to be unnecessary.

Major Findings and Conclusions

"The review of present conditions here and abroad and the analysis of proposed legislation, presented in this report, indicate that this vitally important problem, whose implications and ramifications are deeper and farther reaching than may appear at first sight, needs more prolonged and penetrating consideration, free from all bias in favor of any method or scheme for solution thus far tried or proposed, than it has yet received. Such consideration is essential before legislative experiments in this field may be safely undertaken, either by Federal or State governments, with reasonable assurance of satisfactory and beneficial results to industry and society. While the opportunity remains to work out a solution of the problem wholly or largely by private and cooperative endeavor, it would seem that all possible efforts should be directed to that end.

"Certain definite conclusions regard-

ing the possibilities and the limitations of insurance as applied to unemployment may be drawn from the present study, which may be summarized as follows:

"The hazard of unemployment is largely uninsurable. Insurance must be effected on a mathematical basis, but an analysis of the several types of unemployment discloses that in general the conditions which determine them do not permit mathematical computation.

"The risk of unemployment is not subject to statistical measurement with the same degree of accuracy that is possible in the case of the risks of life, fire and accident insurance. This risk varies with the personal qualities of individuals, as well as with the occurrence of various contingencies, so that the likelihood of becoming unemployed is very unequal for different persons. Another difficulty is that the payment of compensation to unemployed workers tends to create more unemployment through the natural psychological response of wage earners to the opportunities held out by the insurance system. The satisfaction of some claims to unemployment compensation tends to give rise to others, so that the risk is increased by the very effort to cover it by insurance.

"The analogy that has been drawn between workmen's compensation and unemployment insurance is largely fallacious. Not only is the unemployment risk far less susceptible of statistical measurement than is the accident rate, but also it is much more difficult to control through preventive measures. It cannot be reduced by mechanical safeguards, preventive devices, and educational work among employees. The preventive principle can be applied to unemployment only to a very limited extent, as compared with the possibilities of its application to industrial accidents. This difference in respect to preventability between the unemployment risk and the accident risk in industry arises from the fact that the causes of unem-

ployment are very largely beyond the control of employer or employee, while the causes of industrial accidents are to a considerable extent within their control.

Hazard of Depressional Unemployment

"Another serious factor of difficulty in the case of unemployment insurance is the hazard of depressional unemployment. This is vastly more favorable in its proportions than is the catastrophe hazard in compensation insurance. It has no calculable limits in respect to extent, severity and duration. No law of depressional unemployment has been developed, and it is doubtful whether such a law is reasonably possible. Even if it be assumed that the unemployment risk could be computed, were adequate data available, the fact remains that such data are conspicuously lacking in the United States. The first step toward scientific solutions of the unemployment insurance problem in this country must be in the direction of assembling the necessary factual information.

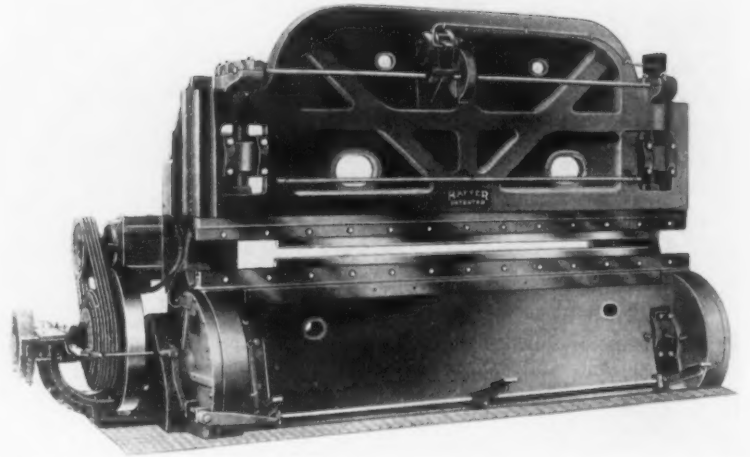
"If unemployment in general is an uninsurable risk, it follows that the term unemployment insurance cannot properly be applied to the European systems of universal public unemployment benefits that now bear the insurance label. These systems are unemployment relief measures, not insurance plans. To deny the term insurance to measures which commonly pass under that term is something more than a quibble of words. It represents a fundamental difference in viewpoint. The term insurance as applied to unemployment and similar social problems has been borrowed from European practice, which has tended to fix attention chiefly upon the indemnities to be provided. American usage, on the contrary, has emphasized the methods by which the funds to pay benefits are accumulated and administered. With the exception of a few State funds for providing compensation benefits, the development of insurance in the United States has been a matter of private business. Since private business cannot be good business unless it is successful, the usual tendency of Amer-

(Concluded on page 1413)



Press-Brake with Driving Mechanism Within the Base

Low Headroom and Straight Down-Pull Making for Accurate Work Are Features



Front view of Rafter press-brake; rear view showing C-shaped connecting rods is illustrated below.

THE Farrel-Birmingham Co., Inc., Ansonia, Conn., is offering a new type of press-brake and quick-release die holder which it is manufacturing as sole licensee under patents granted the Rafter Machine Co., Belleville, N. J., which has built and installed a number of these machines during the past three years.

The machine will be recognized as a departure from the usual design. Instead of applying the power from above to push the ram into the work, the Rafter machine applies the power from below so that the ram is pulled into the work, thus reversing the usual procedure. A number of advantages are claimed.

In having the entire driving mechanism attached to or contained within the base, the overall height of the machine is reduced, and less headroom is necessary. Driving gears are fully inclosed and run in an oil bath; they have generated teeth and are mounted on bearings on both sides to assure permanent alinement and smooth, quiet operation.

Motion is transmitted to the ram by two C-shaped connecting rods, actuated by eccentrics within the base. These connecting rods are long enough as virtually to eliminate any angularity between them and the ram. The resulting action is practically a straight downward pull that avoids side thrust of the ram on the gibs,

emphasized as an important factor in the maintenance of die accuracy and the continuous production of accurate work.

The eccentric shafts are separate, individual units of heavy construction and are amply supported in three large bearings, one bearing each side of the eccentric and one outside the driving gear. The ram adjusting screws are hung in the ram, or, in other words, are rigidly secured only at the top. The lower end of the screw fits into a recess in the ram, which provides a guide for the end of the screw and prevents side motion. The screws are thus constantly in a vertical position, the working strains are always taken in tension with no bending motion. The trunnion nuts have a long bearing and always the same number of threads in contact with the screw; it is impossible to run the screws partially out of the nuts for an extremely short die opening.

There are no side housings. The uprights guiding the ram have only one function—to keep the ram in alinement with the base. They carry none of the operating mechanism beyond the motor and thus are not subject to working strain.

Base and ram comprise the only two major members of the brake, which is constructed of heavy rolled steel plates, welded in accordance with modern practice. The ram is deep,

not only in the center, but on the ends, a construction which adds stiffness and permits the use of long guides. The absence of side housings and crown eliminates dead weight and permits the concentration of weight and strength in the working parts, where it is effective in resisting deflection and producing work of the highest accuracy.

The entire machine is mounted on a heavy, A-shaped base, designed for maximum strength and rigidity to resist deflection and to prevent weaving. No special foundation is said to be necessary; only a flat bed of concrete of sufficient depth to carry the weight is required.

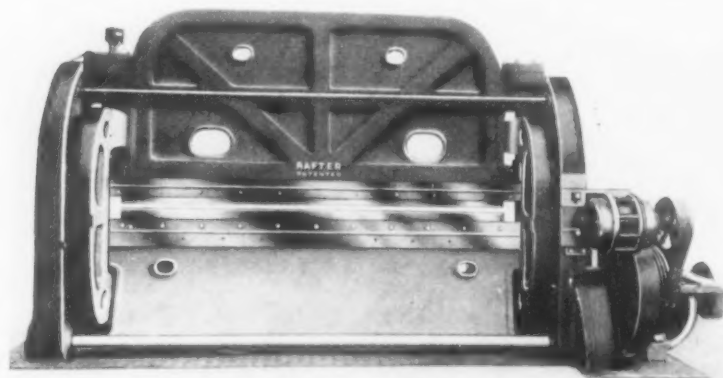
Being of true open-throat type, the machine will take dies up to the full width of the ram and base instead of only the amount of clearance between housings or uprights. For work that must be passed through the machine there is ample room in the rear with freedom from the encumbrances of overhead driving mechanism.

Drive is by motor through multiple V-belt to the flywheel. Drive shaft and flywheel are equipped with roller bearings. The friction clutch is electrically controlled through push buttons operated by hand or foot. All bearings are served by a modern lubricating system.

Quick-Release Die Holder

The quick-release die holder, also covered by Rafter patents, is designed to permit brakes jammed from overloading or other causes to be freed readily. It is pointed out that difficulties usually encountered, sometimes necessitating the burning out of the dies before a machine can be operated again, are eliminated. Simply by loosening a few bolts on the new die holder, the two clamping members can be separated, the die is permitted to drop and the work can be removed without damage to itself, to the die or to the machine.

Production of this press brake has been started and several sizes up to 300 tons capacity will be carried in stock, larger sizes being made to order.



Motorized Ball Race Grinder with Sizing Equipment

COMPLETE motorization and a sizing device that makes operation, in a sense, semi-automatic are features of a new 3-in. ball race grinding machine announced by the Landis Tool Co., Waynesboro, Pa. The machine is adapted for grinding outer ball race grooves on a high production basis and can also be used to grind inner ball race grooves and for miscellaneous radial grinding.

The sizing device is mounted on the work-carrying head at the rear. It is swung into operating position after loading the work and a slight downward pressure at the top of the device lowers the diamond tipped finger of the sizer sufficiently for it to clear the groove. There is a dial indicator graduated to 0.0001 in. and convenient adjustments are provided which enable the operator to change the point at which the feeding-in movement stops. An automatic wheel-feed mechanism steadily advances the wheel by a predetermined amount twice within the space of one oscillating movement. When the raceway is almost down to size, say within 0.001 in. as predetermined by the adjustment, the automatic feed is disengaged by the action of a solenoid controlled by the sizing device. The remaining stock is removed quickly without further feeding-in of the wheel and when the raceway is down to exact size the wheel automatically moves back a few thousandths from the work. This movement also is controlled by a solenoid which is actuated by the sizing device.

The grinding wheel spindle is mounted on duplex preloaded ball bearings and driven from a jack-shaft which receives its power from a short driving drum at the rear of the machine. Wheel feed can be adjusted to remove from 0.00025 to 0.0015 in. from the work diameter at the end of each half-stroke of the oscillating workhead movement. The company's

AUTOMATIC feed operates until work is almost down to size; then grinding is completed and wheel withdrawn under control of a sizing device.

conventional feed-up handwheel is used. Dove-tail ways hold the grinding wheel carriage to the bed and a rack and pinion gear moves the carriage toward or away from the work. The vertical oscillating spindle is ball bearing mounted, the upper bearing being of the duplex preloaded type. Oscillating power is furnished through worm and worm gear by a shaft extending through the bed at the rear. Provision is made to prevent backlash or shock at the ends of the oscillating stroke. The work carrying head is automatic in its oscillation and adjustments permit variation of the arc of oscillation.

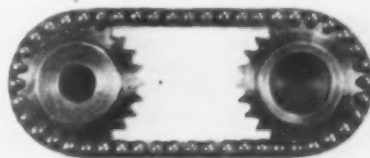
Round leather belting is used to drive the workhead spindle. A driving shaft extends through the hollow vertical oscillating spindle, a grooved pulley at the upper end of this shaft being belted to a similar pulley on the end of the workhead spindle. The driving shaft is powered by a second belt and pulley at its lower end.

One 2-hp., 1150 r.p.m. constant-speed electric motor drives the entire machine. It is mounted at the rear of the bed and is equipped with a two-step pulley giving two spindle speeds and two oscillating speeds. For

changing the work, all drives except grinding wheel rotation can be disengaged by means of a lever at the front of the bed. Standard equipment includes a water pump of full-flow type, but not the typical three-finger spring-loaded type of work-holding chuck shown in the illustration. Floor space required is 31 x 56 in.; the machine weighs 2000 lb.

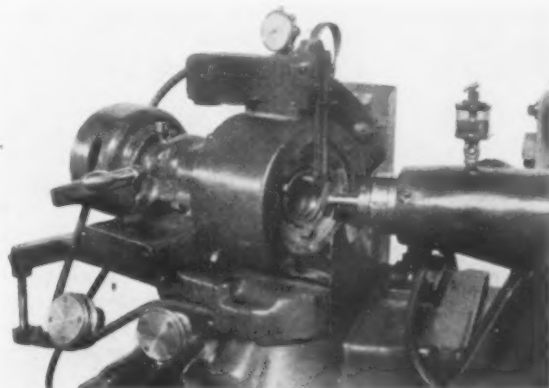
Small Silent Chain Drive

A FLEXIBLE drive with 3/16-in. pitch silent chain for fractional horsepower motors and light mechanisms, is being announced by Link-

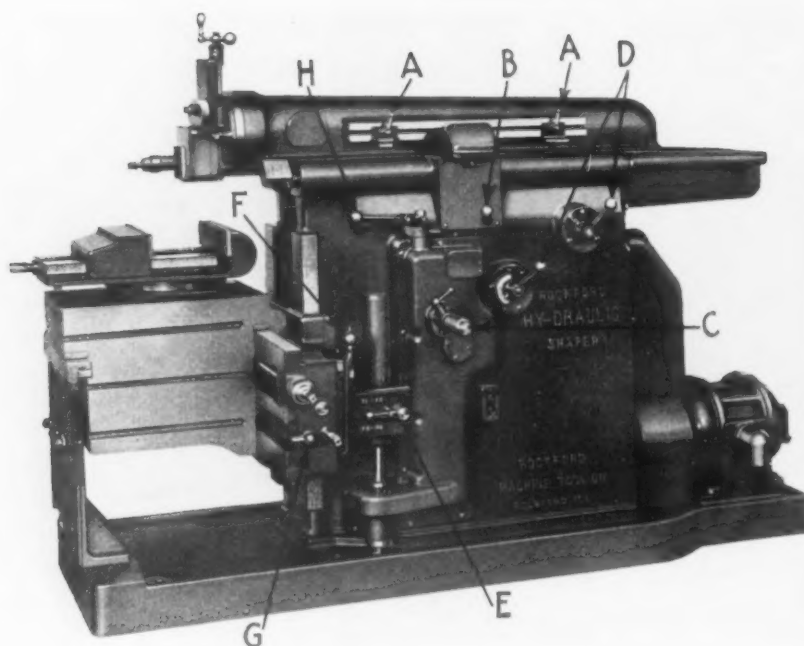


This drive measures about 2 1/2 in. between sprocket centers. Duplex chain is obtainable for intricate reverse-bend drives.

Belt Co., 910 South Michigan Avenue, Chicago. The new chain is made in three types—middle guide, side flanged and duplex. The middle guide and side flanged chains are employed where all shafts are driven in one direction, and the duplex chain where reversed direction is desired on some shaft or shafts, or where adjustment features are desired. This 3/16-in. pitch chain has already been applied as a transmission medium on such equipment as phototone machines, power cameras, television apparatus, regulators, meters, oil burners and similar places where a small positive drive is beneficial.



CLOSE-UP of workhead showing sizing device in operative position. Adjustments permit variation of the workhead arc of oscillation.



New Shaper with Full Hydraulic Action, Including Ram Drive

APPPLICATION of hydraulic drive to the ram as well as to the table feed is an outstanding feature of the "Hy-Draulic" shaper brought out by the Rockford Machine Tool Co., Rockford, Ill. Constant cutting speed and cutting tool pressure throughout the stroke, high ratio of quick return to cutting speed, smooth, high speed operation and the elimination of heavy bull-gear, rocker arm and other mechanical driving parts are among the advantages claimed for the new machine.

Cutting speeds are instantly adjustable from 0 to 120 ft. per min. Full cutting speed of the ram is attained almost instantaneously after reversal at the end of stroke. The reversals are rapid, smooth and shockless as the ram is cushioned by the hydraulic mechanism. Power is applied close to the ram in a straight line directly back of the tool. The moving parts of the ram drive are light in weight and simple in design. They require little power for operation and are self-lubricating.

The maximum ratio of quick return to cutting speed is 3.73 to 1. When the higher cutting speeds are used this ratio can be reduced to a minimum of 1.80 to 1. Altering the stroke length does not change cutting speed. Both stroke length and its position relative to the work are governed by the adjustable dogs marked *A* in the accompanying illustration. The dogs are mounted in a T-slot on the ram and can be adjusted by hand while the machine is in operation. By means of the ball handle *B* the operator can reverse the direction of ram travel at any point instantly, even when the

tool is taking a heavy cut. Although the ram is driven by oil under high pressure, the control is positive and the ram cannot "run away" as the cut is interrupted. Furthermore the liquid acts as a shock-absorber when the tool enters the cut, or encounters a hard spot.

An unlimited number of table feeds up to a maximum of 0.160 in. is obtainable by means of the adjustment *C* which resembles a micrometer thimble. The feed movement is rapid and does not begin until the tool has cleared the work on the return stroke. It is entirely independent of the ram drive and can be adjusted while the ram is in motion.

Any number of ram strokes up to 150 a min. can be obtained by means of the levers *D*. Other controls include the lever *E* by which the direction of table movement, right or left, up or down, can be selected. Lever *F* provides for power elevation or cross travel or the table, while feed and rapid traverse of the table are safeguarded by the automatic stop *G*. Lever *H* is moved forward to start the machine, back to stop; up to rapid-traverse table or rail, and down to feed.

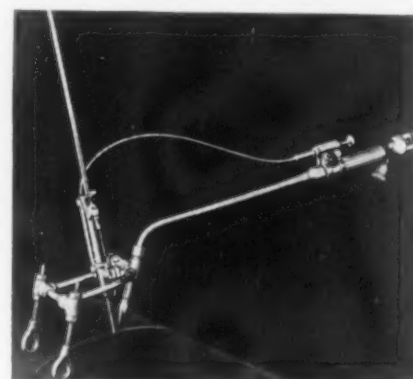
A cutting force of 5800 lb. is obtained when the ram is operating at speeds between 0 and 60 ft. per min.; this is reduced to 2750 lb. at the higher ram speeds up to 120 ft. per min. Specifications include: length of stroke, 25 in., minimum 1 in.; table travel, horizontal, 30 in., vertical, 14 in.; vertical feed to head, 7 in.; driving motor, 10 hp., 1800 r.p.m. Floor space required is 48 x 99 in.; the machine weighs approximately 6200 lb.

Blowpipe with Welding Rod Preheating Flame

TWO flames—one for preheating the welding rod and one for performing the actual welding—are provided by the blowpipe here illustrated, a new product of the Linde Air Products Co., 30 East Forty-second Street, New York, for which patents have been issued and are pending. The blowpipe, which is designated as type W-21 and intended for use with Oxweld No. 24 rod, is said to be almost automatic in operation, permitting continuous gas welding with high efficiency and low gas consumption. Reductions of 40 to 60 per cent of the time required to weld a pipe joint are claimed to result from its use in overland pipe construction.

The welding rod is placed in a special holder and controlled by a trigger on the blowpipe handle which permits the operator to raise or lower the rod at will. This feature is used when rewelding tack welds and in starting and finishing a weld. Rod holders are readily exchanged; they are furnished in sizes for $\frac{3}{8}$, $\frac{5}{16}$ and $\frac{1}{4}$ -in. rod.

In operation, the upper or preheating flame is so adjusted that the inner cone impinges directly upon the rod, preheating it almost to the melting point. Consequently little heat is required from the welding flame to melt



A trigger on the handle of the blowpipe is used to control the position of the welding rod. The rod preheating flame permits faster welding.

the rod. This flame is directed between the vee and the rod so that the welding rod is simultaneously melted and fused with the base metal.

Two carriage runners straddle the weld directly behind the welding puddle; they can be adjusted to obtain the proper position for welding on flat plate or on all sizes of pipe from 4-in. upward. Five sizes of welding heads, from Nos. 9 to 13 inclusive, can be used with the equipment. Detachable tips for the preheating flame are furnished in sizes corresponding to the size of the welding head being used.

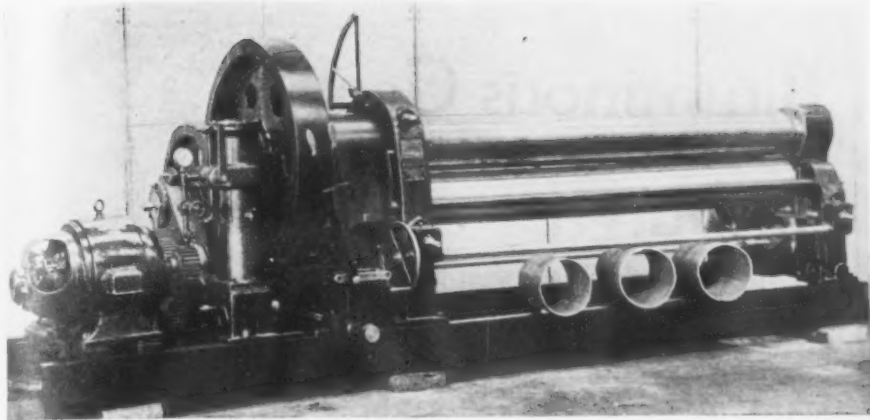


Plate Bending Rolls Designed to Avoid Flats on Ends

TO bend plate and to form cylinders and cones without leaving flat surfaces at the plate ends, the Schatz Mfg. Co., Poughkeepsie, N. Y., has brought out a line of machines, the one here illustrated being designed for rolling class A plate up to 8 ft. 4 in. wide and $\frac{1}{2}$ in. thick to a diameter of 13 $\frac{1}{4}$ in. or more. Other sizes are obtainable to take plates from 41 in. to 20 ft. wide.

The two front rolls are so placed that the center-line of the top roll lies somewhat behind the center-line of the lower roll while the actual bending is done by the adjustable rear roll. All three rolls are of equal diameter (10 $\frac{1}{2}$ -in. on the machine illustrated) and positively driven. They are made of forged steel and are mounted in steel housings.

On the small and medium sized machines, the lower front roll can be raised and lowered so as to pinch the plate, by means of a handwheel at the operator's station. A finely graduated scale on the left-hand housing indicates the adjustment of the front roll for a determined plate thickness. A similar scale is located above for setting the rear bending roll. With these scales it is possible to determine in advance quite accurately what the roll settings should be to bend up a certain radius from any given thickness of plate of equal strength. This, it is pointed out, is a valuable feature especially when producing a number of shells of similar diameter.

The open end of the machine illustrated has a drop-end bearing for the upper roll. This bearing is actuated by an air cylinder which is controlled by means of a lever at the operator's station. A movement of the lever to the left causes the drop-end bearing to open and, at the same time, the top roll is tilted up sufficiently to permit easy withdrawal of the finished cylinder or cone. Another movement of the lever, to the extreme

right, drops the top roll to its normal position and closes the drop-end bearing. All this is accomplished without disturbing the roll setting, so it is possible to roll up another plate of the same thickness and strength to the same diameter. To safeguard the machine against serious damage from accidental overlapping of the plate ends, suitable shearing bolts are employed in each housing assembly.

Drive is by one non-reversing motor, a 20 hp. heavy duty unit on the machine illustrated. The rolls are reversed by means of inclosed clutches and a multiple friction disk

CLOSE-UP (below) shows drop-end bearing in open position. It is operated by an air cylinder which also tilts upper roll to permit withdrawal of finished work.



clutch is provided for adjusting the rear bending roll. Plates of the thinner and weaker types can be rolled to diameters approximately equal to the diameter of the top roll plus $\frac{1}{4}$ in., with good seams for butt-welding. The strong construction of the entire machine permits considerable bending per pass and makes for accurate work. The bending roll illustrated weighs approximately 20,000 lb.

Lathe Grinder Provides Increased Precision

MOTOR-DRIVEN grinders manufactured by the Layth-Grindar Corp., 28 Canfield Street, Orange, N. J., for use on engine and bench lathes have been redesigned to provide increased precision. Seven sizes are offered, ranging from 1 to 1/30 hp., the two smallest sizes being for use on bench lathes.

Standard low-speed, 1725-r.p.m.



motors are employed on the larger units. The $\frac{1}{4}$ -hp. and smaller grinders are equipped with 3450-r.p.m. motors. A one-piece gray iron casting forms the motor base and spindle bearing brackets. The right hand spindle bearing is a long cast iron sleeve, taper ground and lapped. At the other end of the spindle is a four-slotted phosphor-bronze taper sleeve bearing provided with a compression adjustment to take up wear. A ball-thrust bearing holds the hardened and ground steel spindle in its seat. The spindle can be removed without disturbing the bearings.

Drive is by three-step pulleys (two-step in the smaller models) providing a wide range of speeds. The spindle pulley, being between the bearings, equalizes the load between bearings and prevents vibration.

The machine is adapted for internal, external and face grinding on lathes, as well as for flat surface work on planers, shapers and milling machines. By swinging the unit on the lathe compound, angular grinding can be done. Equipment furnished includes an extension arbor for internal grinding, also suitable wheels, diamond holder, etc.

Stabilization of Bituminous Coal Planned at Pittsburgh Conference



SIX distinct plans for the stabilization of the bituminous coal industry in the United States were presented by a special committee at the Third International Conference on Bituminous Coal, meeting at Pittsburgh last week under the auspices of the Carnegie Institute of Technology. They will be submitted immediately to the governors of eight coal-producing States east of the Mississippi River by Dr. Thomas S. Baker, president of the institute and chairman of the conference. The plans were the culmination of a four-day meeting, attended by more than 1000 representatives of the coal industry from practically all countries of the world.

More than a hundred papers covering a wide field of problems in the coal industry were presented by recognized world authorities on such subjects as coal pulverization, gasification, low temperature carbonization, hydrogenation and liquefaction, high temperature carbonization, smoke and dust abatement and coal cleaning.

Four of the six stabilization proposals call for interstate study, regulation or proration of coal production. One suggests the appointment of a "czar" for the industry similar to those of the baseball and motion picture businesses, and another recommends certain enabling acts by Congress and a modification of the anti-trust laws.

Extending Uses of Coal

In discussing the recent contraction in the use of bituminous coal because of the growth of other fuels, as well as the more efficient utilization of all fuels, William A. Forbes, assistant to president, United States Steel Corp., New York, cited three methods by which the use of bituminous coal may be extended in the future. These methods are as follows:

1. Increased installations of by-product coke ovens and by-product gas ovens, with disposition of the resulting coke for metallurgical and domestic purposes; furthermore, attendant discoveries and developments of valuable by-products, as yet unknown, will undoubtedly ensue, as the result of the intensive coal research now in progress.

2. Centralization of large unit power stations, suitably located as to present and prospective population requirements; also to natural resources of coal, with efficient oper-

ation in units modernly equipped for the economical production and distribution over tributary territory, of the power generated through the steam raising medium of pulverized coal or modern stokers.

3. Development of gas producer design and efficient operation, so that gas thus produced can compete with, and probably ultimately supplant, large quantities of fuel oil and natural gas, with resultant benefit to the bituminous coal industry.

According to Mr. Forbes, applications which result in definite fuel economy, together with appreciable increases in yields from by-product ovens as compared with beehive ovens, and efficiencies in allied mechanical equipment, will ultimately stabilize coal requirements throughout the iron and steel industry. He pointed out that "in 1920, 46,908,233 gross tons of coal equivalent were used in the production of 19,277,960 tons of steel ingots and castings, figuring to 5450 lb. of coal per ton of ingots. Of this coal equivalent consumption, 37,710,875 gross tons, or 80.4 per cent, were used as raw coal, and 9,197,358 gross tons, or 19.6 per cent, of coal equivalent were used as substitutes; for instance, tar, blast furnace and coke oven gas, natural gas, fuel oil, etc. In 1929, 44,716,378 gross tons of coal equivalent were used in the production of 21,868,816 tons of steel ingots and castings, amounting to 4580 lb. of coal per ton of ingots. Of this coal equivalent consumption, 33,077,847 gross tons, or 74 per cent, were used as raw coal, and 11,638,531 gross tons, or 26 per cent, of coal equivalent were used as substitutes, similar to those referred to in 1920 practice. Thus in 1929, as compared with 1920, 2,590,856 tons more steel were produced, and 2,191,855 tons less total raw coal and coal equivalent were consumed. Of the above amounts, the reduction in actual coal consumed in 1929, as compared with 1920, was 4,633,028 gross tons, while the coal equivalent of substitute fuels amounted to 2,441,173 gross tons more in 1929 than in 1920.

"Summing up these figures, it is found that in producing in 1929, 2,590,856 tons more steel than in 1920, 4,633,028 less gross tons of coal were mined, a striking example of the advance in efficiency and substitute fuels, all of which substitute fuels are by-products of coal, with the excep-

tion of fuel oil and natural gas, and waste heat reclaimed. Fuel oil consumption was 55,061 gross tons coal equivalent less in 1929 than in 1920, and natural gas consumption was 282,541 gross tons coal equivalent less in 1929 than in 1920, while waste heat reclaimed was 396,577 tons coal equivalent more in 1929 than in 1920."

Piping Pulverized Coal

The piping of pulverized coal in pipe lines, discussed by Friedrich Schulte, director of the Association of Supervisors of the Power Industry of the Ruhr District, Essen, Germany, attracted considerable interest at the conference because of the large market for line pipe which might be developed therefrom. However, Mr. Schulte pointed out that pulverized coal has not been piped for great distances in Germany, although this method of transportation has been used extensively for shorter distances. Both the pressure and suction operations are utilized, the latter being the more common for distances up to 2000 yd. For longer movement intermediate stations must be installed.

Testing Coal for Coking Properties

Preliminary results of a survey of the gas, coke and by-product making properties of American coals, which has been carried on for the past two years by the United States Bureau of Mines in cooperation with the American Gas Association, were presented by A. C. Fieldner and J. D. Davis, who have been conducting the survey for the bureau. The principal objectives of the investigation are the determination of the effect of carbonizing temperature in the range from 500 to 1100 deg. C. on the quantity and quality of coke and by-products obtained from various American coals, and determination of the relation of

the chemical and physical properties of the coal as evaluated by various methods of examining and testing it on the quantity and quality of the carbonization products.

German Research in Coke

Technical progress and economic results obtained by coking research in Germany was discussed by Dr. Kurt Baum, Supervisory Board of the Ruhr Power Industry, Essen, Germany. Dr. Baum stated that as the coke plants in Germany "are generally connected with industries that use heat, and because of the great economic importance of this question, an impartial bureau was established some years ago which made it possible to collect in an ideal manner the knowledge resulting from scientific research in close cooperation with practical operation."

Low Temperature Coke

Production of low temperature coke of high density was outlined by Chevalier Commander Piero Salerni, London, and R. V. Wheeler, Professor of Fuel Technology, Sheffield University, Sheffield, England. Their papers stated that the process for low

temperature carbonization of coal involves the heating of blends of a heavy oil with finely ground coking coal and semi-coke breeze in a rotary retort, with or without oxidation of the charge before carbonization. The object of the process is to produce a semi-coke of high density for domestic or industrial use. Apart from the high density of the coke produced, the process has, according to the writers, the marked advantage of flexibility as coals of widely different characteristics were successfully treated.

Decline of Gas Producer

Recent marked decline in the use of the gas producer in the iron and steel industry was explained by Dr. George V. Slottman, chief fuel engineer, United Steel Companies, Ltd., England. Dr. Slottman stated that "since 1927, a rapid development has taken place in the use of blast furnace gas for melting and reheating operations. The technical difficulties in the control of blast furnaces-coke oven gas mixtures, and in their application to the heating operations of the steel industry have been largely overcome. The practical proof of the applicability of

blast furnace gas—with its low calorific value, to the high temperature operations of the steel industry, has required a complete revision of the list of standard fuel for the several heating operations.

"For high temperature melting and reheating operations, coke oven-blast furnace gas mixtures are rapidly displacing producer gas, the blast furnace gas thus diverted from boiler firing, being replaced with pulverized fuel firing. An impetus has been given to the proper preparation of the raw gases from the blast furnaces, allowing of their more efficient utilization in the blast furnace auxiliaries.

"In a properly balanced steel plant, the waste heat available from coke ovens and blast furnaces is more than sufficient to meet the total heat requirements, the use of solid and liquid fuels being confined to peak loads and to meeting irregularities in the supply of the waste gases. The status of the gas producer, as the primary gasifying agent, is undergoing a complete revision, which will lead to its ultimate elimination from the heating plan of the steel industry."

Railway Car Scrapping by Line Production Method

In systematizing the demolition of railway cars, the line production method presents itself as logical, according to observations of T. M. Hamer, Air Reduction Sales Co., New York, who outlined the procedure before the thirty-second annual convention of the International Acetylene Association held recently at Chicago.

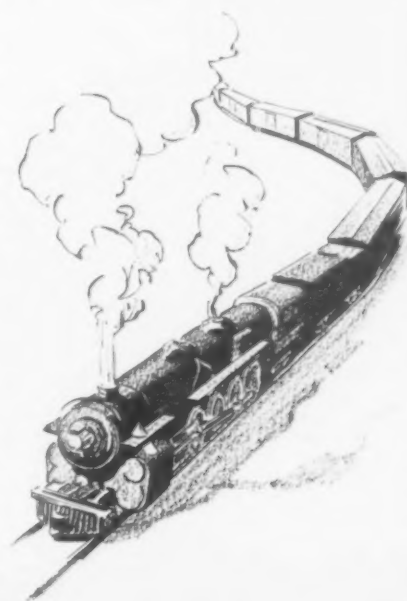
He explained that the primary cause for scrapping is obsolescence, and that the equipment need not be worn to the point where it is no longer serviceable before scrapping operations become profitable. These operations may be performed by a scrap dealer, a contractor or by railway employees. When the work is performed by railway employees, there is the opportunity to keep many of them at work where otherwise it might be necessary to dismiss them. Also, this method affords the opportunity to reclaim various parts from the scrap pile.

By the line production method, instead of demolishing a car at one spot, the car is moved consecutively to a series of positions, at each of which one part or another of the car is removed or dismantled. It is advantageous for the track to have such gradient as to permit easy movement of cars from one position to the succeeding position, without the assistance of a locomotive and without undue exertion of labor.

On one such line there were 12 stations, or positions, and 11 cutters

were employed for scrapping 16 cars a day. There was some other labor beside the cutters. The 11 men assisted on other work when opportunity occurred. Most of the crew had to receive their first instructions in handling the cutting torch when they came on the job and consequently the production of 16 cars a day was not achieved at the start.

However, 800 cars were scrapped in approximately 10 weeks and, except for occasional or unavoidable de-



lays and interruptions, the rate of 16 cars a day was achieved and maintained with comparative ease. At the rate of 16 cars scrapped during an 8-hr. day, it was noted that the average length of time per car per position was 30 minutes, since each car moved forward along the line each 30 minutes, the advantages of line production work became apparent in that the crew at each position was working against time and the men at one position were aware that a delay on their part would adversely affect the production of the entire line.

Piece work rates were developed for this work, on a basis which would permit that the material used in scrapping the cars, such as oxygen and acetylene, be charged against the men using these supplies. This plan resulted in the economical use of material, just as piece work promotes the economical use of time. More careful thought was given to proper tip sizes and gas pressures for cutting purposes than is usually the case, in order to decrease gas consumption without increasing cutting time. The number and size of preheating jets on the cutting tip were not reduced below those normally used, because of the paint, rust, and dust, which would interfere with the cut if the preheats were unduly reduced.

An advantage of the line production method occurs in that each operator can set his gas pressures at the most economical cutting for the position to which he is assigned, and does not require to change pressures or tips to get economical results, as would be the case if one operator did the cutting for an entire car.

Sales Tax May Have Little Chance in New Congress

Higher Rates on Large Incomes Seem Certain—Conflicting Opinions in Senate and House

By L. W. MOFFETT

WASHINGTON, Nov. 24.—Tax legislation at the approaching session of Congress has become a certainty, but it is not possible to say what the character of the new taxes will finally be. Even after President Hoover studies Treasury Department recommendations and submits a program in his budget message to Congress on Dec. 9, it will remain uncertain what the outcome will be. This is necessarily so because of the composition of the new Congress. There will be a close balance between the two major parties in both branches.

Indications are that the Democrats will organize the House, while Administration forces will have a narrow margin in the Senate. But when consideration is given to the factions and blocs within each party neither may be said to have a safe working majority in either branch. In such a situation, a small number of votes may easily determine legislative action, a fact which discloses the strategic position in which the various blocs may frequently find themselves. It is therefore conceivable that they may have a voice in a program of taxation entirely out of proportion to their actual numerical strength. To a certain degree they might conceivably exert minority control, though, when faced with determined opposition from majority forces in both parties and the Presidential veto, such control obviously would have marked limitations. The upshot would seem to be that the taxation program as finally written into the statutes will be a compromise.

Higher Taxes on Large Incomes

It is apparently the plan to pass the bill before March 4, which will mark the end of the next session of Congress, and to make the new taxes effective before income tax returns are due March 15, to apply to 1931. That this is proposed was indicated at a conference last week between Senate Majority Leader Watson, Republican, of Indiana, and Representative Garner, Democrat, of Texas, who probably will be the Speaker of the House. Senator Watson is said to have suggested to Representative Garner that politics be laid aside so as to enact revenue legislation as soon as possible. Mr. Garner expressed the view that the new measure would be on a non-partisan basis and that it would be passed as quickly as possible.

There is one proposal for taxation on which there is rather general

agreement among leading members of both parties in Congress. They have gone on record in favor of increased taxes on the larger incomes. It is said that the Treasury Department recommendations will also suggest higher levies of this kind and, if accepted by the President, will be laid before Congress. Other proposals which appear to find considerable support call for greater inheritance and estate taxes and restoration of the gift tax. These suggestions point to fixing the greater load of taxation upon wealth. But some who favor the principle have warned that if done to an excess it would defeat its own purpose, since it would invite investment in tax-exempt securities. Moreover, it has been pointed out that raising taxes on the higher brackets would not be as effective as sponsors of the plan think it would because some of these brackets have been wiped out by the depression. Some who share this view favor widening of the brackets and establishing a lower base of income for taxation and making assessments all along the line.

Opposition to any kind of sales tax plainly has grown. The "selective sales tax" program tentatively proposed by the Treasury Department has met with such vigorous protest that present indications seem to be that neither it nor any other form of sales tax is likely to be enacted. A sales tax has been the subject of protest from numerous sources, including many members of Congress, business interests, organized labor, civic organizations and others.

The Treasury suggestion that excise taxes be restored on automobiles has been the object of especially vigorous protest. Almost equally strong objection was made to its suggestion for excise taxes on radios and for Federal taxes on gasoline, as well as other products. It is said that the Treasury Department has conceded that there is small likelihood of Congress accepting any kind of sales taxes, or restoring war taxes. Similar

views have been expressed by prominent Republican leaders like Majority Leader Watson and Senator Smoot, Republican, chairman of the Finance Committee, who had come out in support of the general sales tax proposed by Senator Reed, Republican, of Pennsylvania, also a member of the Finance Committee.

Representative Bacharach, Republican, of New Jersey, prominent member of the Ways and Means Committee, had suggested a sales tax on "luxuries" and increased taxes on higher incomes. His sales tax proposal also has met with much opposition both because of objection to any kind of sales tax and the indefiniteness of the term "luxuries."

Smoot Favors Selective Taxes

Because of the important part he will have in framing a taxation program, the proposal of Senator Smoot has attracted much attention. It probably has been given added significance because he announced it after conferring with President Hoover and Secretary Mellon. However, he carefully avoided any indication that it met with the approval of either. His proposal calls for selective taxes and an increase in income taxes. He admitted that it is problematical that Congress will approve a general sales tax, but apparently he thinks that, despite the strong opposition, selective taxes may be assessed.

He has proposed that in addition to selective taxes there be increases in all brackets with the heaviest increase in taxes on the higher incomes. He favors a maximum surtax of 40 per cent on incomes over \$100,000. This would be double the present rate. Senator Smoot said that the amount to be raised by taxation has not been determined, but that he thinks it will be necessary to provide additional revenue amounting to \$1,200,000,000. Indications are that the Treasury deficit at the end of the present fiscal year will be approximately \$2,000,000,000. The slowness of business recovery is causing the deficit to increase rather than decrease and has compelled large scale borrowing which the Treasury is anxious to check.

2321 Airplanes Produced in Nine Months

WASHINGTON, Nov. 24.—Airplanes produced in the United States during the first nine months of 1931 totaled 2321, according to a survey made by the Aeronautics Branch of the Department of Commerce. These craft included 1583 manufactured for domestic civil use, 637 military deliveries and 101 exported. During the first nine months of 1930, a total of 2710 airplanes was manufactured. Of these, 1956 were manufactured for domestic civil use, 556 were delivered to the Army and Navy and 198 were exported.

Railroads to Request Several Modifications in Rate Case

Oral Arguments on Petition of Carriers Will Be Heard by Interstate Commerce Commission Next Saturday

WASHINGTON, Nov. 24.—The Interstate Commerce Commission is expected to act at an early date on the petition of the railroads for modification of the commission decision in the so-called 15 per cent rate advance case. Oral arguments on the petition have been assigned for Saturday of the present week before the entire commission. The outstanding proposal of the railroads concerns the setting up of the Railroad Credit Corp'n. The carriers suggest that this corporation administer funds arising from revenue derived from increased rates which the commission authorized. Instead of placing these funds in a pool to be given to the weaker lines, the railroads have asked that it be loaned.

The other important modifications sought by the carriers relate to proposed added charges per car and to suggestions covering class rates on less-than-carload shipments moving 250 miles and less. The commission proposed increases of \$3 and \$6 per car in rates for a number of commodities. Among the products which were listed for an increase of \$3 per car are iron ore, coke and coal. In the group which was named for a \$6 per car increase are pig iron and scrap. The carriers propose that these charges be converted into cents per net ton. The point is made that different carriers have cars of different capacities. It is urged that the commission plan would create an arbitrary competitive advantage for those roads which have cars of exceptional size and capacity and would result in demands for the application of part carload rates where two smaller cars are furnished by a carrier in place of the larger one available from some other carrier.

It is the suggestion of the carriers that the conversion of charges into cents per ton be done by dividing the proposed car charge by the average car loading of the affected commodity. The average loading would be based on Interstate Commerce Commission reports for 1930. The railroads made no reference to the subject, but it has been stated that their plan would eliminate inequities which apparently would prevail in such shipments as those of iron ore from Lake Superior mines across Lake Erie to interior furnaces. This movement involves two rail hauls and therefore would mean two added charges of \$3 per car each. The assessment of increased charges in cents per ton would do away with this seeming disadvantage to affected interior furnaces.

The carriers also contend for modi-

fication of the commission plan regarding class rates for short-haul movements of less-than-carload shipments. The commission suggestion was for no increase for hauls of 175 miles and less and for an increase of 1c. per 100 lb. for hauls between 175 and 250 miles. The carriers point out that there are many class rate tariffs in which there is no indication of haul involved at a given rate and that the commission provision does not seem susceptible of practical application. The carriers say that the commission's purpose could be accomplished without any substantial change in the proposed rates by substituting a plan they propose, and which would cover less-than-carload shipments whether subject to class or commodity rates. In Official Classification territory the railroads would make no increase between points where the first class rate is 70c. per 100 lb. or less. Between points where the first class rate ex-

ceeds 70c. but does not exceed 82c. an increase of 1c. per 100 lb. would be made. Between points where the first class rate exceeds 82c. an increase of 2c. per 100 lb. would be made. In Southern Classification territory there would be no increase between points where the first class rate is 91c. or less. Between points where the first class rate exceeds 91c. but does not exceed \$1.08, an increase of 1c. would be made. Between points where the first class rate exceeds \$1.08 an increase of 2c. would be made. The Western Classification scale suggested would call for no increase where the rate is 99c. or less, an increase of 1c. where the rate exceeds 99c. but does not exceed \$1.17 and an increase of 2c. where the rate exceeds \$1.17.

The suggestions of the carriers for modification of the commission decision apparently means delay in putting higher rates into effect. Even more important there is a question as to whether the commission will refuse to grant any modification. In such an event the entire case would collapse unless the carriers finally yielded to the decision in full. The general opinion, however, is that compromises will be made and that increased rates will become effective on short notice, as the decision provides, on or about Jan. 1.

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Taylor Society to Hold Three-Day Meeting

Application of standardization to production management, standard costs, power and mechanization as causes of depression, and national planning are among the topics scheduled for discussion at the Taylor Society meeting, which will be held at the Hotel Pennsylvania, New York, Dec. 2-4.

Standard costs will be covered by G. Charter Harrison in a paper on "Standard Costs as an Element of Managerial Technique," at the afternoon session Dec. 3, while at another session, to be held simultaneously, "Power and Mechanization as Causes of Depression" will be discussed.

A paper on the "Development and Application of Standardization to Production Management," by Myron H. Clark, vice-president, Reading Iron Co., Reading, Pa., will feature the opening session, Dec. 4. E. P. Blanchard, assistant sales manager, Bullard Co., Bridgeport, Conn., and King Hathaway, consulting engineer, Manning, Maxwell & Moore, Inc., New York, will discuss the paper. "Some Reflections on National Planning" will feature the evening session, Dec. 4; speakers will include R. E. Flanders, manager, Jones & Lamson Machine Co., Springfield, Vt.

The twentieth anniversary dinner, to be held the evening of Dec. 3, will include addresses by Robert T. Kent, vice-president, Divine Brothers Co.,

Utica, N. Y., and a founder member of the society; Dr. H. S. Person, managing director of the society, and H. P. Kendall, president of the society. Hans Mars, head of the management section of the National Labor Council, Vienna, Austria, will speak on "A Foreign Guest's Appraisal."

Other sessions will be devoted to administrative control as illustrated by the Hills Brothers Co., Brooklyn; measurement of consumer attitudes; hospital management; teaching of management; responsibility of the church for the solution of industrial problems; and coordination in public administration.

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Gulf States Steel Co. Will Open Its Airport

Formal opening of the airport being constructed by Gulf States Steel Co. adjoining its plant at Gadsden, Ala., will take place Dec. 10. W. H. Coverdale, president of the company, will deliver the dedicatory address. The entire expense of constructing this airport is being borne by the Gulf States company, which will extend all privileges of the field to those who may desire to use it.

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Barrett Bindery Co., 1332 West Monroe Street, Chicago, has issued a 32-page booklet on "How to Take Inventory in a Manufacturing Plant." Free copies may be obtained from the company upon request.

Heat Treatment of High-Speed Steel Discussed at Hartford

SOME practical information of interest to high-speed steel users was contained in an informal address at the November meeting of the Hartford, Conn., chapter of the American Society for Steel Treating by David H. Nemser, chief metallurgist, Pratt & Whitney Co., Hartford.

Proper Hardening Practice

After discussing the properties conferred by the different alloys in high-speed steel, he dealt at length with proper hardening practice. Electric furnaces equipped with gas curtains give the advantage of being able to duplicate time-temperature schemes. The salt bath, being a vertical pit furnace, offers a decided advantage in hardening tools which have long shanks. In hardening threaded tools the furnace atmosphere must be of proper proportions during every instant of the heating time to prevent scaling.

No gaseous combination of carbon and oxygen, with carbon in excess, can offer a truly neutral atmosphere. The solution lies in the application of an inert gas. A truly neutral gas should permit the production of parts free from scale or carburization. Such tools should be larger after hardening than in the annealed condition inasmuch as they are essentially martensitic after hardening—the least dense of all micro-constituents. These conditions do not exist in any form of open fire high-speed steel hardening today.

A full heat of 2310 to 2340 deg. F., when properly quenched, will insure full secondary hardening in an 18-4-1 high-speed steel with carbon 0.65 to 0.75 per cent. A soak at the hardening temperature is not advisable if uniform results are to be expected upon tempering. Tools $\frac{1}{4}$ in. in diameter and smaller do not require a preheat. Moderate sized tools should be given a single preheat at 1450 to 1500 deg. Large tools should be double preheated at 1200 deg. and at 1650 deg.

Molten lead or salt at 1100 deg. F. is the best quenching medium for tools of intricate design. When the pieces are removed from the bath they are in an austenitic condition and may be readily straightened. Air quenching is not good for tools whose exact dimensions must be maintained, due to the oxidation produced by this quench.

Standards for Carbide Segregation

The limited time which can be allowed the tools in the high heat chamber makes good carbide distribution essential if complete solution is to be obtained. For this reason the following standards of allowable carbide segregation have been adopted by the Pratt & Whitney Co.:

Up to $1\frac{1}{2}$ in. in diameter, no segregation streaks are allowed.

$1\frac{1}{2}$ in. to 3 in. diameter, edge must have carbides nicely distributed. Streaks permissible at center. Hooks not permissible.

Over 3 in. diameter edge must have carbides well distributed. Streaks or hooks permissible at center. Complete cellular structure at center not permissible.

Micros at 100 magnification are made on annealed bars. Where it is possible, upset forgings are used in place of large bars to secure better carbide distribution at the center.

Interesting Points in Discussion

The discussion, led by Lester A. Lanning, chief metallurgist, New Departure Mfg. Co., Bristol, Conn., brought out many interesting points. Mr. Lanning said that Taylor and White had recommended a 2310 deg. quench and 1100 deg. draw when they introduced high-speed steel, but that it had taken until 1920 for this to be adopted generally. High scrap high-speed steel has better forging qualities than that made largely from muck bar. The phenomenon in forging high-speed steel of differing malleability of different lots of forgings and the subsequent requirement of extra reheating was not explained, but it was concluded that the extra reheating should not affect the quality of the forging. The fish-tail fractures found in some rehardened tools can be prevented by annealing before rehardening.

A. H. D'Arcambal of the Pratt & Whitney Co., called attention to the practice recommended for reducing distortion in hardening high-speed steel by hardening, annealing, finish machining and hardening again. He said that the experience at Pratt & Whitney did not prove this treatment of value. Tool bits are best quenched from 2400 deg. in air and drawn at 1050 deg. as toughness is sufficient at this treatment.

Finish of Machine Surfaces to be Standardized

A request for the establishment of national standards for the quality of finishes of machine surfaces—a subject having an important bearing on interchangeable manufacture—has been submitted to the American Standards Association by the American Society of Mechanical Engineers. The A.S.M.E. has offered to act as sponsor or, with some other body, as joint sponsor for the project, if its initiation is approved by A.S.A.

Establishment of a basis of measurement for the quality of finish of machine surfaces would make it possible to classify different machine finishes, to compare them, and to designate

them on shop drawings and in specifications by a standard number, symbol or term. The need for some kind of classification has been particularly felt, in the last few years, by the manufacturers and users of grinding equipment.

Quality designations, such as "rough," "commercial," "smooth," "fine," "mirror," "extra," "ultra," have been adopted by individual companies, but such terms are likely to have a meaning differing with each organization. Moreover, insofar as they are not tied down to measurable properties, they can be interpreted only by means of samples. Sets of such samples—also of finishes other than those which are ground—are actually used by several firms as a guide for their engineering, production and other departments.

Anti-Injunction Bill to Be Introduced Again

WASHINGTON, Nov. 24.—Senator Norris, Progressive Republican of Nebraska, has announced his intention to reintroduce what he terms the "perfected" anti-injunction bill at the coming session of Congress. The Nebraska Senator is author of the bill and says he will make every effort to have it promptly and favorably reported by the Judiciary Committee and passed by the Senate. He will oppose further hearings, as he did without success at the last session.

The principle of the measure has the support of the American Federation of Labor. That organization evidently does not consider it a "perfected" bill, however, apparently seeing constitutional and perhaps other defects in it. This was denoted by several amendments proposed by attorneys for the federation at the recent meeting in Vancouver.

Steel Treators on Coast Inspect Metal in Ship

The Golden Gate chapter of the American Society for Steel Treating at San Francisco held its recent meeting as guests of the Matson Navigation Co., with dinner at Pier 32, followed by a brief program of talks and later a thorough inspection tour of the trans-Pacific liner Maui, with special reference to the application and use of metal and steel in its construction and operation. More than 100 members and guests attended.

Howard S. Taylor of Stanford University, vice-chairman of the chapter, presided, and speakers included Dr. W. J. Crook, Stanford University, who has just returned from an extended European trip, and Millard R. Hickman, superintendent of engineering, J. R. Selfridge, his assistant, and Lloyd Kennedy, chief engineer, all of the Matson Navigation Co.

OFF THE ASSEMBLY LINE



Ford Motor Co. to Place Steel for First Quarter This Week

DETROIT, Nov. 23.

THE Ford Motor Co. is expected to make commitments this week covering its steel requirements for the first quarter of 1932. This will give the companies participating in this business an opportunity to make their plans for the early part of next year with some definite idea of what tonnage they can count on as a minimum schedule. It is believed in the local steel trade that this action on the part of the Ford company will provide the impetus which suppliers have been waiting for and which will precipitate buying by other motor car makers.

The placing of orders for steel three months in advance is a distinct departure from the policy to which the Ford company has adhered, but is justified from both a psychological and practical standpoint. It will hearten steel mills which have gone through exceptionally lean days by giving them assurance of a certain backlog of business for the first quarter so that they can adjust their programs accordingly. It will be a mark of renewed activity by the Ford organization, the idleness of which has been sharply felt by suppliers in recent months. It will act as a signal of Ford's faith in a revival of retail car buying in the not distant future. It is likely to unloose orders from companies which observe in Ford's action the feeling that steel prices are at bottom and now is a good time to buy ahead.

Aside from the imminence of this transaction by the Ford company, the situation at Rouge is unchanged. There has been considerable talk about work on the new car being held up by last minute changes in the design of certain parts, but the general opinion is that Ford is now tooled up and ready to start production when Mr. Ford gives the word. However, the matter of getting operations on a production basis is a slow process and there is little likelihood that the Rouge

Ford Motor Co. is expected to place orders this week for its first quarter steel requirements. This marks a departure from Ford's previous purchasing policy. Other automobile companies are now inquiring for steel prices for the early part of next year.

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Buick has stepped up production to 600 cars a day, being the busiest company in the industry. The new Chevrolet will be shown early in December. Plymouth will exhibit its present car at the 1932 shows. A new Nash is to be presented in January.

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Developments promised for 1932; a quality maker in Detroit will expand its line to include an eight-cylinder car in the \$1500 class; a manufacturer outside Detroit now confining its activities to cars in the higher brackets of the medium-price group probably will bring out a car selling under \$1000; Hupmobile is expected to offer three new series of cars.

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Seventy-two motor car companies in Michigan employed 112,158 men in October, compared with 149,427 in September and 186,996 in October, 1930. The average weekly payroll, however, was \$30.81 in October, against only \$20.94 in September and \$27.54 in October of last year.

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plant will be running all its departments on parts for the new car until the middle or latter part of December. Under the circumstances, observers are inclined to dismiss earlier reports that Ford will make about 60,

000 units of the revamped model before the end of the year. Meanwhile, Ford continues to rehire men at Rouge at the rate of about 1000 a day. Parts makers still are standing by, hoping from day to day to get releases on orders contracted for a month or two ago. The Ford steel plant remains closed with a large stock of steel on hand; one blast furnace is operating. The amount of pig iron stored at Rouge is said to be almost 300,000 tons.

Operations Held Back During Mild Weather

There is a general feeling in Detroit that not only Mr. Ford, but also other manufacturers are holding back work on new models during the unusually mild autumn weather which has prevailed here so as to give employment to as many thousands as possible during the winter months when employees are in worst need of a steady income. Incidentally, it is reported that Detroit's public welfare department has saved over \$100,000 in the past month in fuel costs for dependent families as a result of the relatively warm weather.

Officials of the Buick Motor Co. are much heartened by the unusual interest shown in the 1932 line, displayed for the first time on Nov. 14. On the strength of reports from dealers, the company is understood to have increased its production from 450 cars to 600 cars five days a week. Buick is now the busiest plant in the automobile industry. Chevrolet is getting ready its new car for a public announcement early in December, with first deliveries to be made to customers in January. The Fisher Body Corp. has bought some steel for its Flint and Pontiac plants, but has made only light purchases for its Cleveland plant, which makes Chevrolet bodies. There is much discussion about what General Motors will do with Oldsmobile and Oakland, now that Buick

overlaps the field of these two cars. While various Buick models run up as high as \$2,055, f.o.b. Flint, the two-passenger business coupe and five-passenger sedan in the series 50 sell at \$935 and \$995, respectively, and it is in the series 50 that Buick expects to do a good share of its 1932 business.

Plymouth has announced that it will exhibit its present line of cars at the New York automobile show, thus dispelling stories that it will offer a new body design at that time. It is said that considerable work has been done in developing a body to displace the present one, but this will be held in abeyance for the present. It is reported that Plymouth has a sizable stock of bodies on hand which was produced by a local body builder during the period when Plymouth operations were being sharply curtailed. Chrysler, Dodge and DeSoto are doing little, but should assemble a moderate number of cars in December.

Companies to Expand Lines

A Detroit manufacturer in the quality group is preparing to expand its line to include an eight-cylinder car in the \$1,500 class. It is now buying steel for the first 5000 jobs of this series. A company outside Detroit in the higher brackets of the medium-price class is now working on a car to sell under \$1,000 and probably will have it ready for the New York show. As a feature of its higher-priced cars for 1932 it may offer an automatic clutch control differing somewhat in design from Buick's. Hupmobile is to offer three new series of cars and presumably will still be represented in the six-cylinder and eight-cylinder fields. Hudson and Essex distributors gathered in Detroit the past week for a series of meetings and a pre-showing of 1932 models. A poll taken at one of the sessions revealed the opinion that they expect to handle at least \$75,000,000 worth of cars next year. In the peak year of 1929 the volume reached \$225,000,000. Hudson has added 2000 men to its factory force and will call in 7000 more shortly.

The Piquette Avenue plant of the Studebaker Corp'n. is being renovated and modernized for the assembly of the Rockne six, parts for which will be made by Studebaker at South Bend and by outside parts makers. Suppliers are said to be bidding now on this business. It is not known how soon production of this newcomer will begin, but it will not be until some time early next year.

Retail motor car sales in October are placed by trade authorities at 102,000 units. Since production for the United States and Canada is estimated at only 86,000 units, it is evident that dealers are being given an opportunity to clean out stocks prior to introduction of next year's models. Last month Chevrolet sold 37,921 cars to consumers, compared with 37,674 in the same month of 1930 and 38,685 in September. Cadillac retail sales in October totaled 1227 units.

Die Casting Industry Moves Toward Economic Planning

Program Formulated by Bureau of Foreign and Domestic Commerce May Thus Receive Its First Trial

WASHINGTON, Nov. 24.—Effective economic planning for the die casting industry of the United States is understood to be in contemplation. Should the program be adopted, as it is apparently believed it will, this industry would be the first to take advantage of the American economic plan presented by Director Frederick M. Feiker of the Bureau of Foreign and Domestic Commerce before the New York Trade Association Executives at New York, Oct. 30.

Mr. Feiker laid before the trade association executives a broad program for economic planning, which he said had been tentatively formulated by representative trade associations and business representatives, looking to the setting up of machinery by which, with the aid of the Bureau, industry may plot its future development along stable and safe lines.

Points in the program outlined by Mr. Feiker are said to have been the subject of a conference held here last Thursday between a committee of the American Die Casting Institute and Secretary of Commerce Lamont. The institute was said to represent approximately 80 per cent of the die casting industry, and it is understood that the committee proposed to Secretary Lamont that the bureau aid it in a survey of the industry along the lines of the economic plan that the bureau and business interests have been working on. Secretary Lamont is said to have readily offered the services of the department. The next step, it is reported, will be to get approval of the institute members.

Die Casting Institute Officers Attend Washington Conference

A statement issued by President W. G. Newton of the Institute and president of the Newton Die Casting Corp'n., New Haven, Conn., said that the committee conferred with Secretary Lamont "regarding the problems of their industry and the possibility of inaugurating a development program nation-wide in scope." Other members of the committee are Charles R. Murray, president of Barnhart Brothers & Spindler, Chicago, and H. R. Rhinehart, Philadelphia, secretary of the institute.

Broadly, it is understood the contemplated survey would look to an adequate system of cost accounting in order to familiarize producers with costs of production, and a complete market analysis covering distribution,

profitable areas for different units of the industry and related problems which would call for a wide statistical review.

To indicate potentialities of the industry, when based upon a sound economic plan, Mr. Newton gave a sketch of its growth and accomplishments.

"The industry is relatively young," he said, "die castings having been produced in this country only 25 years. During that brief period, the annual volume has constantly expanded until it is now approximately \$25,000,000, and tremendous strides have been made in the perfection of alloys used by the industry, as well as the expansion of the uses of die castings; so that today their application is constantly growing and the industry rapidly becoming basic in its structure, offering employment to an ever-increasing number of highly skilled artisans.

"In its early history, die castings were largely confined to lead. As a result of extensive research and consequent refinements in metals, as well as the perfection of processes, die castings are now being made of zinc, white metal, aluminum and yellow brass and are extensively used."

Government Will Help in Coordinating Program for Industries

In explaining the economic planning program, Mr. Feiker said that it would be made available in its final form to the trade or industrial organization which seeks to move forward toward the stabilization of its future. The plan is expected to be announced in the near future as finally determined upon, and it is assumed features of it have been determined upon in sufficient definiteness for the die casting industry to make use of the bureau's services in conducting a survey of the subjects it has in mind. In his address, Mr. Feiker made it clear that the Government can help and coordinate, but the burden rests upon every individual business group and business organization to put its own house in order.

The program covers eight lines of activity: Market research and analysis; product research; investment and equipment replacement; budgeting, forecasting and statistical control; simplification and development of standard specifications; development of sound inter-industry relations; wages and employment; standard trade practices.

PERSONALS

ERNEST F. DUBRUL, general manager of the National Machine Tool Builders' Association since 1921, has retired from this position to engage in consulting work in finance, marketing and management, with offices on the thirteenth floor, Enquirer Building, Cincinnati. He received his college education at Notre Dame University, having been graduated later in economics from Johns Hopkins University. Prior to his connection with the machine tool builders' association, he was vice-president and later president of Miller, DuBrul & Peters Mfg. Co., and president of the Pyro Clay Products Co.



E. F. DUBRUL

J. B. BERRYMAN, first vice-president of the Crane Co., Chicago, has been elected president to succeed Richard T. Crane, Jr., who died recently in New York. Mr. Berryman has been associated with the company since 1892.

FRANK J. LANAHAN, president of the Fort Pitt Malleable Iron Co., Pittsburgh, and H. H. ROBERTSON, president of the H. H. Robertson Co., Pittsburgh, have been named to represent the metal trade on a new group to be known as the special advisory committee of the National Safety Council. The new committee is to co-operate with the executive committee of the council in broadening the activities of the entire safety movement.

GEORGE G. SHALLENBERGER has been appointed manager of the Great Northern Iron Ore Properties, St. Paul, Minn.

S. HORACE DISSTON, formerly vice-president in charge of sales of Henry Disston & Sons, Inc., Philadelphia, has been made second vice-president and assistant general manager of the company. HARRY K. RUTHERFORD has become sales manager of the industrial division.

H. G. DALTON, senior partner of Pickands, Mather & Co., Cleveland, has been elected a director of the Bankers Trust Co., New York, succeeding the late Samuel Mather.

JOSEPH E. WUICHET, foreign trade secretary of the Connecticut Manufacturers' Association, sailed last week for a four months' visit in South America, where he will investigate representatives of 13 Connecticut companies, study trade conditions and in some instances appoint additional representatives.

C. W. CURTISS has been made president of the Waterbury Clock Co., to succeed IRVING H. CHASE, who has become chairman of the board. WILLIAM H. WHITE, of Middleboro, Conn., has been made treasurer. Mr. Curtiss will serve as general manager also.

A. LA MEYER has been advanced from general manager of sales of the Alan Wood Steel Co., Conshohocken, Pa., to vice-president in charge of sales.

O. C. KAHLER, formerly general superintendent of the J. G. Brill Co., Philadelphia, has been placed in charge of sales in eastern Pennsylvania for the Meadville Malleable Iron Co., Meadville, Pa., in its new offices at 1018 Girard Trust Building, Philadelphia.

LEWIS B. LINDEMUTH, consulting engineer, New York, is leaving this week for the steel works of the Cia. Fundidora de Fierro y Acero, Monterrey, Mex., to be gone for several months.

WRIGHT E. MCILROY, former supervisor of distribution for S K F Industries, Inc., has been appointed sales manager of Aluminum Industries, Inc., Cincinnati, with F. R. MICHENER, assistant sales manager. CHARLES W. MCDANIEL has been named director of sales.

J. B. HECHT, who was formerly identified with the Perry, Buxton, Doane Co., has been added to the staff

of H. T. Henning & Co., Philadelphia.

GEORGE B. HOGABOOM, chemical engineer, Hanson Van Winkle Munning Co., Matawan, N. J., is scheduled to speak on electroplating at a joint meeting of the American Electroplaters' Society and of the Worcester, Mass., chapter of the American Society for Steel Treating, Dec. 16.

JAMES J. RYAN, previously identified with the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed professor in mechanical engineering, machine design section, college of engineering and agriculture of the University of Minnesota.

OBITUARY

JOHN W. GARLAND, vice-president of the Automatic Signal Co., New Haven, Conn., and for many years identified with the metal-working industry in the Pittsburgh district, died at his home in New Haven on Nov. 21. He was born at Dungannon, Ireland, and went to Pittsburgh when he was 14 years old, where he was employed by the Oliver & Roberts Wire Co. In 1890 he entered the structural steel business on his own account, and later manufactured an automatic chain which he had invented. He was later engaged in the manufacture of electrical steel conduit in Lawrence County, Pa., under the name of the Garland Corp'n. He was active in this business until his partial retirement in 1918.

ROBERT C. CRAWFORD, president of the Atlas Foundry Co., Detroit, died Nov. 22, after a long illness. A native of Glasgow, Scotland, he came to this country in 1902 and seven years later entered the employ of the Detroit Foundry Co. In 1916 he became president of the Atlas company. He was 58 years old.

HARRY T. WICKES, one of the founders of the Wickes Boiler Co. and of the United States Graphite Co., Saginaw, Mich., died in Los Angeles, Nov. 20, as the result of an operation. It was largely through the efforts of Mr. Wickes and his brother, William J. Wickes, that Saginaw was transformed from a lumber town into an industrial center. He took an active part in the management of the Wickes Boiler Co. until 1922, when ill health forced him to leave Saginaw. He was 71 years old.

JAMES W. DEETRICK, long associated with the Republic Iron & Steel Co., died Nov. 18 at the Youngstown Hospital, after a five months' illness. During most of his career in the steel industry, Mr. Deetrick was associated

with T. J. Bray in the Republic company and, at the time of his retirement in 1928 was vice-president in charge of operations. He started as a chemist with the Youngstown Sheet & Tube Co., and later served the Carnegie Steel Co., in the same capacity. Subsequently he joined the Valley Iron Co., in a similar capacity, and in 1899 this company was merged with others to form the Republic Iron & Steel Co. Mr. Deetrick was a member of the American Iron and Steel Institute, American Institute of Mining and Metallurgical Engineers, and the American Society for Testing Materials. He was 61 years old.

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ANDREW TELFER, formerly manager of the Pittsburgh mills of the National Tube Co., died at his home in Tampa, Fla., on Nov. 17. He was born in Boston in 1877, and was graduated from Syracuse University, Syracuse, N. Y., in 1899. In 1919 he became identified with the National Tube Co. as manager of its Continental mills, and later served in a similar capacity in the City mills. He had retired in January, 1930.

♦ ♦ ♦

GEORGE F. STEWART, for 21 years consulting engineer with the United Shoe Machinery Corp., Beverly, Mass., died at his home in Swampscott, Mass., Nov. 17.

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CHARLES M. HELMER, president of the Hall Fire Brick Co., Inc., Buffalo, died at his home in that city on Nov. 15, after a long illness. He had been identified with the brick manufacturing industry for nearly half a century.

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Sheet Production and Shipments Up in October

Production and shipments of steel sheets by independent mills gained a little in October over September, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers. Production was 122,739 tons, against 116,842 tons in September. Shipments in October increased to 129,365 tons from 123,371 tons in September. Sales in October declined slightly from the previous month, and unfilled orders also showed some falling off. The October report and comparison in net tons follow:

	Oct.	Sept.	Aug.
Sales	117,195	120,688	122,849
Production	122,739	116,842	123,752
Shipments	129,365	123,371	151,529
Unfilled orders	159,367	167,366	170,122
Unshipped orders	66,778	75,816	74,245
Unsold stocks	70,465	67,337	75,288
Capacity per month	548,000	540,600	525,100
Percentage reporting	67.6	67.6	67.6
Percentages, Based on Capacity			
Sales	31.6	33.0	34.6
Production	33.1	32.0	34.9
Shipments	34.9	33.8	42.7
Unfilled orders	43.0	45.8	47.9
Unshipped orders	18.0	20.8	20.9
Unsold stocks	19.0	18.4	21.2

Ohio Foundrymen Seek Reduction of Accidents to Cut Compensation Costs

PLANT safety and methods of reducing foundry accidents in an effort to secure lower State insurance rates were discussed at the annual meeting of the Ohio Foundries Association held at the Deshler-Wallick Hotel, Columbus, Nov. 19. Officers were reelected for the ensuing year. They are A. H. Kramer, Advance Foundry Co., Dayton, president;

private industrial insurance. Dr. W. E. Obetz, medical director, Ohio Industrial Commission, pointed out the importance of first aid, especially in the prevention of infection, which is the basis of 28 per cent of all foundry claims filed with the State board. By eliminating infection through prompt first aid, foundrymen can save \$150,000 a year in medical and compensation costs, he declared. First aid training also promotes greater safety among employees, he said.

Ohio Rates Said to Be Low

The plan under which the State commission operates, keeping individual records of each of the employer-clients, the amount they have paid into the State insurance fund and the amount that has been paid from each individual fund, was outlined by E. I. Evans, actuary, State Industrial Commission. Foundry employers in the five Ohio classifications, he said, have paid \$5,739,000 into the State industrial insurance fund since the commission was organized, and this group has paid out \$5,650,000 in accident claims during the same period. The total foundry payroll during the period was \$434,000,000. Mr. Evans pointed out the important part employers play in determining accident insurance rates. Failure to take organized action to reduce accidents, he said, increases the rates, for with increased accidents and increased awards, the State commission must boost its rates. Comparing rates with those in adjoining States, he showed that the Ohio rates are lower than those in New York, Michigan, Indiana and Pennsylvania.

Thomas P. Kearns, superintendent, State Division of Safety and Hygiene, declared that satisfactory results cannot be obtained until foundrymen organize for a concerted safety program, and J. W. Beall, insurance commissioner, Ohio Steel Foundry Co., Lima and Springfield, said that the reduction in insurance rates obtained by steel foundries indicated that foundrymen in the other groups could bring their rates down.

The five point program of the Ohio Foundries Association for reducing accidents through the use of safety forms, providing proper first aid equipment, carrying on a safety educational program, clearing old cases off the insurance docket and following new cases through so that they are disposed of speedily, was outlined by Secretary Hoierman.

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A sales agency for handling at wholesale and retail the surplus domestic coke of the Toledo furnaces of the Interlake Iron Corp. has been organized under the name of Toledo Coke, Inc., by interests associated with the Interlake corporation and Pickands, Mather & Co.



A. H. KRAMER

Joseph H. Bruce, Bowler Foundry Co., Cleveland, vice-president; Charles Seelbach, Forest City-Walworth Run Foundries Co., Cleveland, treasurer, and Robert Hoierman, Cleveland, secretary. James L. Wick, Jr., Falcon Bronze Co., Youngstown, was elected a director, succeeding Robert C. Hopkins, Alliance Brass & Bronze Foundry Co., Alliance, who declined to serve another term. Four directors reelected for the ensuing three years were: William P. Anglemeyer, Star Foundry Co., Troy; Charles E. Dine, St. Marys Foundry Co., St. Marys; E. A. Leary, Cincinnati Steel Casting Co., Cincinnati, and Charles Seelbach.

Discussing the present State foundry code, Fred G. Bennett, Buckeye Steel Casting Co., Columbus, said that this code was completed after a study of codes of several other States, making a revision of the old State code and after numerous hearings had been held in all sections of the State. The new code, he said, does not specify precautions for the elimination of all accidents, but merely provides a model for foundrymen to follow in adopting safety programs.

The rapid change of foundrymen from private to State-controlled insurance was revealed by Wellington T. Leonard, chairman, Ohio Industrial Commission, who said that less than 250 of the State's employers now have

Liquidation and Curtailment Still Continue

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

FAVORABLE FACTORS

1. Weekly commodity price indexes indicate considerable stability, the number of advances and declines being closely balanced.
2. Recovery in grain prices from the summer low levels promises to improve somewhat the condition of many farmers.
3. A small gain in railroad freight traffic, allowing for seasonal variation, occurred in October; as industrial production probably declined somewhat, a better balance between total production and total shipments is indicated.
4. Department store sales averaged higher in October.
5. Some of the signs which usually attend bottom levels in the business cycle may be seen: merchandise imports moving irregularly sideways for six months; automobile production index down to its average relation with building activity index; factory payrolls far below their average relation with factory employment.
6. The return of greater confidence in our monetary system.
7. Depleted stocks of commodities in the hands of dealers and consumers.
8. The apparent disposition of the administration to balance the nation's budget by increased taxes and operating economies.

UNFAVORABLE FACTORS

1. Monthly indexes of commodity prices have touched new low levels; raw materials continue to decline as a group.
2. The P-V line reacted a little in October.
3. Factory employment and payrolls fell unseasonably to new low levels.
4. Trend of foreign trade is downward, exports having fallen to a new low.
5. Decline in unfilled orders of the Steel Corporation indicates a decrease in new business; machine tool orders have declined further, and orders for finished cotton cloth are off.
6. Automobile and building trades continue backward.
7. Evidence of a letdown in textiles, shoes and tobacco—the most active industries in recent months.
8. Accumulating stocks of lead, copper, zinc and cotton cloth.
9. Large amount of frozen investments and security loans held by banks; declining deposits.
10. Fear and uncertainty resulting from the possibility of inflation in bank credit, in connection with large extensions of Government credit next year.

AFTER a spurt, commodity and security prices have turned reactionary. Hopes for inflation now await the action of Congress; meanwhile, frozen bank credit, international complications and uncertainty as to prices make general business recovery before next spring highly improbable. The painful process of liquidation and curtailment continued during October and as yet there is no indication that the business curve will not be still lower in November. The seasonal trend is now downward in most basic industries, and possibly the first indications of stabilization will come in the shape of a less-than-seasonal decline.

The great difficulty with business is the heavy burden of debt which affects governments, municipalities, corporations and individuals. These debts—the symbol of past inflation—and the uncertainty about repayment of loans and value of "investments," prevent the release of such surplus buying power as exists. Accordingly, the great need of the time is a general settlement of debts and a determination of a value of equities. Also much reorganization and recapitalization will be required.

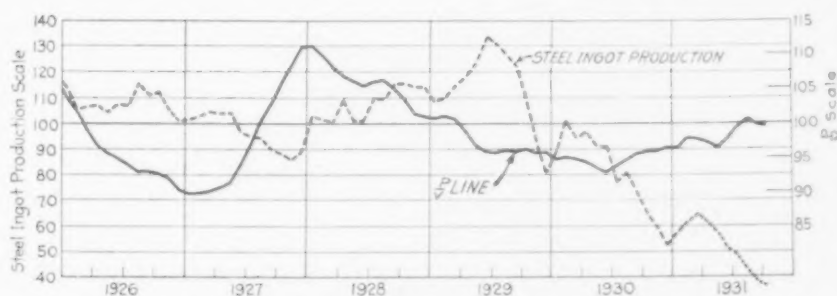
Some chains of debts might be "cancelled." In some cases, debts can be scaled down, making due allowance for the change in the purchasing power of monetary units. In many other cases they can be

partially repaid and the balance can be refunded.

All along the line, there is need of a determination of the solvency of parties to debts. We need a more definite understanding of the relations of creditors and debtors, to restore hope and confidence. A definite, workable basis for settlement is the great essential. Once paper losses are taken and creditors and debtors can reach a definite basis for settlement, it will be found that buying power will be released and confidence restored.

The P-V line (a ratio between commodity prices and the physical volume of trade) indicates that readjustment between supply and demand has made considerable progress. The volume factor has fallen to low levels, and for months has been declining more rapidly than the price factor. This probably reflects the fact that prices are so low in comparison with cost of production in many cases that sellers are beginning to hold their products more firmly, though the existence of large stocks of many commodities is unquestionably an important factor tending to keep markets depressed.

Opinions that commodity prices have fallen to permanently lower levels may be confirmed by the slight reaction in the P-V line in October, which possibly indicates that a general reduction in the level of buyers' demand prices, or bids, has occurred.



The Iron Age, November 26, 1931—1389

DOES the reaction in the P-V line indicate a permanently lower commodity price level? For months the volume factor has been falling faster than the price factor.



Improving Trade by Ourselves

TOO much probably has been said to the effect that we cannot expect good business in the United States if there is not good business elsewhere. Such statements can be exaggerated and there is danger of resultant harm. The American people needed to be taught that business and financial relationships with other countries have grown up and count for more than they did before the steamship, the cable and the wireless, but perhaps so much has been said that people have come to believe that there is a hard and fast rule, when such is not the case. In all time, including the period since the war, some countries have been much less or much more prosperous than others. Yet the prosperous countries have not concluded that their prosperity was all wrong and that they must get down to the level of the unfortunate countries.

For eight years after the Civil War railroad building was the mainspring of activity. Yet it might have been argued that we could not build railroads because China was not doing so! France and Germany did not refrain from developing the automobile a quarter century and more ago because we were doing so little in this direction, nor did we hesitate to build more than five million automobiles in 1929 because the rest of the world was building less than a million.

Lately there has been some preaching that we may take the lead in the world's recovery, and pray why not? It is likely that unduly watching conditions in foreign countries is detracting from attention that should be given to improving conditions at home.

We export or import very little coal outside of our Canadian trade and we are free to produce and consume as much coal as can be contrived, irrespective of what is done elsewhere. Very little of the total coal we consume is used in making merchandise that is exported, nor do merchandise imports materially affect our coal consumption. Again, foreign trade has almost nothing to do, except quite indirectly, with our construction work.

When such egregious blunders in thought were made in the "new era" period that faded out of sight two years ago, it is perfectly reasonable to suspect that we are in great danger of making blunders in thought now, of an opposite character. It is well that we be informed of what is going on abroad, but we should not allow our judgment or emotions to be swayed from the right course. We have been so badly off that a little improvement would be very easy,

and an ascending spiral the natural sequence. Conditions abroad may be an impediment but they need not be a prohibition.



Coal and "Social Control"

IT is to be doubted that any one who attended the third international conference on bituminous coal at Pittsburgh last week expected it to find the cure for the near-to-death sickness from which the soft coal industry has long been suffering. To one harking back to the 1928 investigation of the United States Senate the things said at the Carnegie Institute sessions, so far as they related to conditions in this country, had a familiar sound. The Senate found that there were too many mines and too many miners, that there was far too much poverty among miners and that far too much coal was being sold at a loss. But just as had been predicted the Senate's investigation left miners and operators not a whit better off than before.

Last week's Pittsburgh conference kept up the legend of all post-war discussion of the coal problem in the cropping out of suggestions that the distress of the American industry could only be relieved by special intervention of Government. And that recalls the proposal seriously made in 1928 by Senator Davis, the Secretary of Labor, and others that the Sherman law be so amended that coal operators could go before the Federal Trade Commission or the Attorney-General and secure a permit to cooperate and form trade agreements. Two of the speakers at Pittsburgh last week—Mr. Taylor of the United States Steel Corporation and Governor Ritchie of Maryland—were outspoken in telling the coal men of the futility of any expectation of relief by Government price fixing or other measures involving new legislation.

"The great need," said Mr. Taylor, "is for development within the industry of a sincere desire and purpose to correct these conditions. I cannot escape the feeling that the trouble has been due more to the lack of the will to do the reasonable and proper thing called for in the public interest than to obstacles supposedly presented by the anti-trust laws to rational and wholesome action. I earnestly hope to see the industry awakened to a clear sense of its full responsibility and opportunity in this matter."

It would take volumes to tell of the old-time efforts to regulate soft coal mining by differentials agreed on by miners and operators to cover varying thicknesses of veins and other inequalities in mining in the different districts. Hardly less voluminous is the record of railroad regulation by giving low freight rates to

develop mines more remote from lake ports. In all those maneuverings there were intense struggles of competitive interests with very little of what Mr. Taylor calls "the will to do the reasonable and proper thing called for in the public interest." The folly of operators who year after year went on selling an irreplaceable mineral at a loss was matched by the folly of the United Mine Workers in spending millions of their levy of \$40 a year per miner to enforce the impossible Jacksonville wage scale—millions that might well have been used in establishing thousands of surplus miners in other employments.

The country's experience with special laws for farm relief is far from encouraging to any expectation that the soft coal industry can be made prosperous by new legislation. Further consolidation of mines is possible under existing laws, likewise the organization of selling agencies, as well as the use of those association methods by which other industries have realized the benefits of cooperation under the law. The Pittsburgh conference has done well to emphasize the present depression as a summons to the soft coal industry to work out its own salvation and not put its trust in Congress or in any measure of so-called "social planning and social control."



Inflation During a Depression

WORDS did not prevent the depression and words will not prevent business recovery. In the last analysis, about all that has been learned from the economic developments of the past few years is that hindsight is far better than foresight and that the safest policy, in the long run, is to be prepared for the unexpected. During the new era period we heard little about the danger of an economic collapse. Business was fundamentally sound. At present we hear virtually nothing of the possibility of a business upturn. Instead we are bombarded on all sides with warnings against inflation.

It is true that the amount of Federal Reserve credit in use today is the greatest since 1921. But Reserve credit has been expanded only as a means of replacing credit immobilized through domestic hoarding of currency and foreign withdrawals of gold. It is estimated that the amount of money taken out of circulation in this country totals \$1,300,000,000. Surely if no steps had been taken to replace those dead dollars the price structure would have undergone a collapse that would have spelled disaster.

So long as so large a volume of currency is hoarded and inert, it is absurd to state that the country is suffering from a condition of inflation. As was well said in the November review of the National City Bank of New York, inflation is a psychological impossibility until business confidence is restored. When confidence does finally return, it is possible that Reserve credit may be retired less rapidly than hoarded funds return to circulation. In such a case there would be temporary inflation of a limited character, which would have salutary effects in the early stages of business recovery.

Hence it is well for business men to avoid confus-

ing the emergency moves of the Federal Reserve banks with inflation. Likewise it is good policy to be prepared for at least a temporary upswing in prices when trade finally revives.



Auto and Steel Trade Activity

AUTOMOBILE production in the first ten months of this year was in exactly the ratio to steel production that obtained, on an average, in the first ten months of the six years preceding. In 1925, 1926 and 1929 the ratio was above the average and in 1927, 1928 and 1930 it was below the average. These are the statistical facts, reasons being clear in some cases and recondite in others. One can see why automobile production ran 10 per cent low relative to steel production in 1927, for in May of that year manufacture of Ford Model T was discontinued, while in 1928 the automobile deficiency was slight, perhaps about equal to unfilled Ford orders at the close. In 1929 people thought they were very prosperous, and ran automobile production up 10 per cent over average relationship to steel.

Detailed figures will be given. The study is naturally of ten-month periods. As to the general relationship, in the first ten months of seven years, including this year, approximately 99 cars and trucks, United States and Canada, were produced for every 1000 tons of steel ingots produced in the United States. For the purpose of this computation ingot production was divided into automobile production and with appropriate placing of the decimal point the quotients were increased by 1.19 per cent to make a series of index numbers for the seven years which would average 100. The index numbers are given below, a high index number indicating that the automobile industry fared better than the steel industry and vice versa.

Index Numbers, Automobile Production to Steel Production
(First ten months of each year)

1925.....	103.8	1929.....	110.2
1926.....	106.0	1930.....	91.8
1927.....	89.3	1931.....	100.3
1928.....	98.6	Average.....	100.0

The figures should be viewed chiefly for their economic significance. They do not represent with any precision the proportion of steel produced which went to the automobile industry taken as a whole, for exports of parts varied widely and steel went for repairs, accessories, etc. The proportion of total steel made which went into the automotive industry has been shown by the annual findings of THE IRON AGE for full calendar years as follows: 1925, 13 per cent; 1926, 14½ per cent; 1927, 14 per cent; 1928 and 1929, 18 per cent; 1930, 15½ per cent. In 1928 Ford production was light while in 1929 it was heavy, while the number of automobiles produced relative to steel produced was 12 per cent higher in 1929 than in 1928, whereas both years were reported as absorbing 18 per cent of the steel. Otherwise some studies that have been made indicate that year by year the average weight of automobiles produced has varied but slightly.

It is an interesting and important fact that this year automobile production has been in the average

ratio to steel production that was shown by the six years preceding. It is a matter of car and truck purchases by the public. The public, viewed as buyers of automobiles, have been neither better nor worse off this year than buyers of steel in general. That

may easily be the case next year. Estimates of automobile production this month and forecasts for next month are only remotely related to public buying ability or disposition, the principal factor being the time when new models are put into production.

American Machinery May Be Affected by British Tariff

Tariff Commission May Study Possible Effects on Our Trade—
United States Steel a Small Factor

WASHINGTON, Nov. 24.—Study by the Tariff Commission of the effect of British tariff duties already assessed or contemplated on products imported from the United States is said to be under consideration by the administration. It is understood the proposal looks to possible revision of duties on products imported into the United States from Great Britain. It has been made clear, however, notwithstanding reports to the contrary, that reprisals are not in any way being proposed.

The view held here generally is that manifestly Great Britain has just as much right to impose protective or revenue duties as the United States and other countries. As a matter of fact, there is a sentiment, especially among Republicans, that in the end Great Britain's turning from free trade to protection will not only help stabilize her own industrial situation, but will lift that country to a higher purchasing power basis and thereby place it in a position to consume more imports of kinds which she does not produce.

Revisions that might be made in the American tariff on products imported from Great Britain apparently would be with a view to strengthening anti-dumping features of the law rather than having any character of retaliation. This angle has taken on renewed importance since it is considered that the cost of British production has been lowered through the abandonment of the gold standard. This has brought the value of the pound down about 20 per cent to approximately \$3.90. It has at the same time had the effect of setting up protection against imports, and additional duties already levied under the anti-dumping bill are held to increase the duties to the extent of the amount provided, some of which are as high as 50 per cent. Under the bill they can be raised as much as 100 per cent.

So far iron and steel and metalworking machinery have not been included in the list on which duties have been named, but probably will be. United States exports of iron and steel to Great Britain are relatively small. Exports of metalworking machinery, on the other hand, reach a

large total. It has been pointed out, however, that the vast bulk of metalworking machinery imported from the United States is of special types which are not produced in Great Britain and that, assuming consumers are still able to purchase them, the volume of the movement from the United States would not be affected, though they would cost more by reason of the added duty. Germany apparently would be hardest hit, since it is the chief country of importation into Great Britain of metalworking machinery which is commonly produced in Great Britain.

In the case of iron and steel, it has been a source of considerable speculation as to why Great Britain has not protected itself against imports of various kinds which are received in large quantities, especially from Belgium, Germany and France. The rebate system, intended to encourage consumers of steel in Great Britain to buy from domestic producers, apparently has not been effective as had been hoped. This is indicated by the fact that British imports of iron and steel are exceeding exports. In the first nine months of the current year, the balance against Great Britain was 487,163 gross tons, imports totaling 1,937,999 tons against exports of 1,450,836. Of these, only 24,693 tons was received from the United States. The more important United States products making up this total were steel bars, 5195 tons; welded black steel pipe, 4656 tons; black steel sheets, 3678 tons; welded galvanized steel pipe, 1901 tons, and iron and steel scrap, 1446 tons. Imports from the United States in 1930 totaled 44,878 tons, the distribution of the foregoing products being as follows: Steel bars, 15,174 tons; welded black steel pipe, 6723 tons; welded galvanized steel pipe, 2444 tons; black steel sheets, 2439 tons, and scrap, 4177 tons.

Imports of iron and steel into Great Britain in the first nine months of the current year came chiefly from Belgium, which supplied 913,545 tons, with France second, supplying 314,082 tons, and Germany third, furnishing 288,657 tons. The largest items of importations are semi-finished materials,

chiefly blooms, billets and slabs, while other importations consist of bars, rods, angles and sheet bars, followed by sizable lots of numerous other products, such as pig iron and finished lines.

Total 1930 exports of industrial machinery from the United States to the United Kingdom were valued at \$22,313,106. The largest single item consisted of industrial sewing machines, valued at \$1,680,235. Other important items were steam specialties, such as injectors, gages, safety valves, steam traps, boiler tube cleaners, etc., \$181,067; engine accessories, \$119,318; excavators, \$210,438; concrete mixers, \$79,434; freight elevators, \$126,559; rock drills, \$139,028; "other" mining and quarrying machinery, \$414,179; "other" oil well and oil refinery machinery, \$578,745; pumping equipment, \$589,789; tool grinding, cutter grinding and universal grinding machines, \$126,398; planers and shapers, \$188,098; other metal grinding machines, \$178,667; sheet and plate metalworking machines, \$787,712; forging machinery, \$147,494; foundry and molding equipment, \$347,161; "other" power-driven metalworking machinery, \$1,633,639; pneumatic portable tools, \$426,395; drills and reamers, \$167,364; textile machinery, \$1,580,562; paper and pulp machinery, \$244,124; "other" wood-working machinery and parts, \$391,596; blowers and ventilating machinery, \$125,749; bottling and bottle washing machinery, \$308,837; air compressors, \$472,698; meat and other grinding and slicing power-driven machines, \$271,945; power-driven laundry machines, \$640,863; other laundry and drying equipment, \$599,974.

Canada's Copper Output Declined This Year

Canadian production of copper in September was 24,887,931 lb., of which 20,563,352 lb. was blister. Output for nine months of this year was 225,000,709 lb., compared with 236,090,030 lb. in nine months of 1930.

The Ford Motor Co. will reconstruct, enlarge and modernize one of the blast furnaces at the Ford plant at Dearborn, Mich. The contract, which has been placed with Arthur G. McKee & Co., Cleveland, includes the erection of improved design McKee offtakes and downcomers, dust catcher and centrifugal dust collector. The improvement will involve an expenditure of approximately \$160,000.

Automobile Tonnage Promises to Bolster Year-End Steel Output

Ford to Place Large Orders for December and First Quarter—Ingot Output Down to 29 Per Cent Following Early November Gains

THE Ford Motor Co. is expected to place substantial steel orders this week for December rolling, and in addition will contract with the steel mills for its first quarter requirements, calling for a minimum of 100,000 tons. Ford's needs may amount to as much as 300,000 tons of steel, although this will depend on retail sales of motor cars.

Release of this business, which will be accompanied by similar blanket orders for other materials used in automobile manufacture, may do much toward stimulating the lagging purchases of other automobile manufacturers, since delays in Ford's production of new models have held back final plans of some other companies. Assembly of the new Ford cars will, it is said, be begun about Dec. 15.

December output of automobiles, according to estimates gathered by THE IRON AGE, will be between 125,000 and 150,000 units, compared with 86,000 in October and probably a slightly smaller number this month. The steel that will be needed next month for automobile manufacture may tend to offset the usual year-end decline in miscellaneous consumption, prompted by inventory retrenchment.

ASIDE from the automobile companies, industrial activity, as reflected in steel orders, is still marked by extreme irregularity, gains in some directions being nullified by losses elsewhere. The net result, partly influenced by the holiday, is a decline in steel ingot production this week to 29 per cent of the country's capacity, compared with 31 per cent in the two preceding weeks.

There has been a restriction of ingot output in the Pittsburgh, Youngstown, Cleveland and eastern Pennsylvania districts, with the Chicago area remaining at its last week's low point of 22 per cent. Products of the steel mills are variously affected, the slight increase in orders for sheets, strip steel and bars, mainly from the automobile industry, being insufficient to overcome the light buying of structural steel, plates and pipe for building construction and the general postponement of railroad orders, which may be still further protracted because of the failure of the railroad unions and the carriers to agree on wage reductions.

SUCH increases as there have been in steel production this month have been sustained partly by the hand-to-mouth purchases of miscellaneous users. Any gain in the requirements of the major consumers would therefore be immediately reflected in steel production.

Building construction, which is in a seasonal decline, has taken only 14,500 tons of structural steel in the week. Much contemplated work is being delayed, an example being the Golden Gate bridge at San Francisco, requiring 110,000 tons of steel, which is held up by the failure of the California Supreme Court to render a decision on the legality of the bond issue.

Dullness in railroad demand is relieved only by some car repair work, for which the Chesapeake & Ohio will buy 4000 tons of plates and shapes and the Norfolk & Western has ordered 1000 tons. The Northern Pacific is taking bids on 150 hopper cars. The Illinois Central will recondition 400 old freight cars per month.

In pipe lines the only important project near the closing point is 23,000 tons for a 20-in. natural gas extension from Geneseo, Ill., to Milwaukee, to be built by the Continental Construction Corp.

The uneven flow of business has had varied consequences. A structural mill in the East is shut down for the entire week. Some other mills will cease operations from Wednesday night until Monday morning. A steelworks blast furnace in the Valleys has been put out and the merchant blast furnace at Pittsburgh has been banked, but a merchant furnace in the Valleys will go into blast next week. On the side of improvement is the largest bar tonnage that Chicago mills have had in five months, and there are better operations of some sheet and strip mills. Moreover, tin plate bookings are gaining, permitting mills to roll some of this tonnage in anticipation of January shipments.

AWARDS of pending automobile steel probably will disclose the trend of prices for first quarter. The Ford Motor Co.'s purchases are often made under the market. There are reports of weakness in automobile body sheets and to a lesser extent in galvanized sheets. An outright reduction of \$3 a ton has been made on vitreous enameling stock. Concessions are frequently developed by the larger buyers of structural shapes and plates. Prices of stove bolts have been advanced. Announcements of first quarter prices are expected about Dec. 1.

Steel scrap has declined 50c. a ton at Buffalo and is weak in nearly all consuming markets, reflecting the failure of steel production gains to carry through to a higher level.

Quotations affecting THE IRON AGE composite prices are unchanged. The finished steel average remains at 2.116c. a lb., pig iron at \$14.96 and steel scrap at \$8.75.

▲ ▲ ▲ A Comparison of Prices ▲ ▲ ▲

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron,

Per Gross Ton*	Nov. 24, 1931	Nov. 17, 1931	Oct. 27, 1931	Nov. 25, 1930
No. 2 fdy., Philadelphia.....	\$15.51	\$15.51	\$15.76	\$18.26
No. 2, Valley furnace.....	16.00	16.00	16.00	17.00
No. 2 Southern, Cincinnati.....	14.69	14.69	14.69	14.69
No. 2, Birmingham.....	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*.....	17.00	17.00	17.00	17.50
Basic, del'd eastern Pa.	16.25	16.25	16.75	17.75
Basic, Valley furnace.....	15.00	15.00	15.00	17.00
Valley Bessemer, del'd P'gh., ..	18.26	18.26	18.26	19.26
Malleable, Chicago*.....	17.00	17.00	17.00	17.50
Malleable, Valley.....	16.50	16.50	16.50	17.50
L. S. charcoal, Chicago.....	25.04	25.04	25.04	27.04
Ferromanganese, seab'd car- lots.....	\$85.00	\$85.00	\$85.00	94.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Finished Steel,

Per Lb. to Large Buyers;	Nov. 24, 1931	Nov. 17, 1931	Oct. 27, 1931	Nov. 25, 1930
Cents	Cents	Cents	Cents	
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill..	2.50	2.50	2.50	2.45
Sheets, galv., No. 24, P'gh....	2.90	2.90	2.90	2.95
Sheets, galv., No. 24, Chicago dist. mill.....	3.00	3.00	3.00	3.10
Hot-rolled sheets, No. 10, P'gh	1.70	1.70	1.70	2.05
Hot-rolled sheets, No. 10, Chi- cago dist. mill.....	1.80	1.80	1.80	2.15
Wire nails, Pittsburgh.....	1.90	1.90	1.90	1.90
Wire nails, Chicago dist. mill	1.95	1.95	1.95	2.00
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.30
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.35
Barbed wire, galv., P'gh.....	2.55	2.55	2.55	2.60
Barbed wire, galv., Chicago dist. mill.....	2.60	2.60	2.60	2.75
Tin plate, 100-lb. box, P'gh.,	\$4.75	\$4.75	\$4.75	\$5.00

Rails, Billets, etc.,

Per Gross Ton:				
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh..	29.00	29.00	29.00	31.00
Sheet bars, Pittsburgh.....	29.00	29.00	29.00	31.00
Slabs, Pittsburgh.....	29.00	29.00	29.00	31.00
Forging billets, Pittsburgh....	35.00	35.00	35.00	36.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb., ..	1.60	1.60	1.60	1.60

Old Material,

Per Gross Ton:				
Heavy melting steel, P'gh....	\$10.25	\$10.25	\$10.12½	\$12.75
Heavy melting steel, Phila....	8.00	8.00	8.00	12.00
Heavy melting steel, Chicago	8.00	8.00	8.00	10.00
Carwheels, Chicago.....	8.50	8.50	9.00	11.75
Carwheels, Philadelphia.....	11.50	11.50	12.00	14.00
No. 1 cast, Pittsburgh.....	10.00	10.00	10.00	12.50
No. 1 cast, Philadelphia.....	10.50	10.50	11.50	12.00
No. 1 cast, Ch'go (net ton)...	8.50	8.50	8.50	9.50
No. 1 RR. wrot., Phila.....	9.50	9.50	10.00	13.50
No. 1 RR. wrot., Ch'go (net)	6.50	6.50	6.50	8.50

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.60
Bars, Chicago.....	1.70	1.70	1.70	1.70
Bars, Cleveland.....	1.65	1.65	1.65	1.65
Bars, New York.....	1.93	1.93	1.93	1.93
Tank plates, Pittsburgh.....	1.60	1.60	1.60	1.60
Tank plates, Chicago.....	1.70	1.70	1.70	1.70
Tank plates, New York.....	1.88	1.88	1.88	1.88
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago....	1.70	1.70	1.70	1.70
Structural shapes, New York	1.85¼	1.85¼	1.85½	1.85½
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.00
Hot-rolled strips, Pittsburgh	1.50	1.50	1.50	1.55
Cold-rolled strips, Pittsburgh	2.05	2.05	2.05	2.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt.....	\$2.40	\$2.40	\$2.40	\$2.50
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	6.87½	7.37½	7.37½	12.12½
Electrolytic copper, refinery..	6.25	6.75	6.75	10.25
Tin (Straits), New York.....	23.12½	23.25	22.87½	26.12½
Zinc, East St. Louis.....	3.12½	3.30	3.25	4.10
Zinc, New York.....	3.48½	3.65	3.60	4.45
Lead, St. Louis.....	3.65	3.90	3.62½	4.95
Lead, New York.....	3.85	4.05	3.75	5.10
Antimony (Asiatic), N. Y....	6.62½	6.75	6.50	7.15

▲ ▲ ▲ The Iron Age Composite Prices ▲ ▲ ▲

Finished Steel

Nov. 24, 1931
One week ago
One month ago
One year ago

2.116c. a Lb.
2.116c.
2.116c.
2.135c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.

	High	Low
1931.....	2.142c., Jan. 13;	2.102c., June 2
1930.....	2.362c., Jan. 7;	2.121c., Dec. 9
1929.....	2.412c., April 2;	2.362c., Oct. 29
1928.....	2.391c., Dec. 11;	2.214c., Jan. 3
1927.....	2.453c., Jan. 4;	2.293c., Oct. 25
1926.....	2.453c., Jan. 5;	2.403c., May 18
1925.....	2.560c., Jan. 6;	2.396c., Aug. 18

Pig Iron

\$14.96 a Gross Ton
14.96
15.00
16.11

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1931.....	\$15.90, Jan. 6;	\$14.96, Nov. 10
1930.....	18.21, Jan. 7;	15.90, Dec. 16
1929.....	18.71, May 14;	18.21, Dec. 17
1928.....	18.59, Nov. 27;	17.04, July 24
1927.....	19.71, Jan. 4;	17.54, Nov. 1
1926.....	21.54, Jan. 5;	19.46, July 13
1925.....	22.50, Jan. 13;	18.96, July 7

Steel Scrap

\$8.75 a Gross Ton
8.75
8.75
11.58

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low
1931.....	\$11.33, Jan. 6;	\$8.71, Oct. 27
1930.....	15.00, Feb. 18;	11.25, Dec. 9
1929.....	17.58, Jan. 29;	14.08, Dec. 2
1928.....	16.50, Dec. 31;	13.08, July 2
1927.....	15.25, Jan. 11;	13.08, Nov. 22
1926.....	17.25, Jan. 5;	14.00, June 1
1925.....	20.83, Jan. 13;	15.08, May 5

Pittsburgh Expects Heavier Steel Buying by Automobile Industry

PITTSBURGH, Nov. 24.—The prospect of heavy purchases of finished steel products by automobile manufacturers has again led to improved sentiment in this market in spite of the fact that ingot production has declined both at Pittsburgh and in the Valleys.

Specifications thus far in the month apparently did not justify the increased rate of steel production which has been maintained recently, but enough raw steel was accumulated to bring about a downward revision of ingot production schedules this week in the face of slightly improved finishing mill operations in some lines. This is particularly true in the case of strip steel and sheets, and, to a lesser extent, in bars.

That the November rise in steel operations could be sustained as long as it was with practically no assistance from the major consuming channels is an amazing indication of the essential vitality of the industry. Releases from the railroads have been negligible, and shipments to the automotive industry were at a minimum. Recent building operations have been principally confined to the completion of projects begun earlier in the year on which steel had been shipped.

It may thus be assumed that recent production has been sustained largely by the hand-to-mouth purchases of miscellaneous consumers, whose requirements have been reduced to a minimum, and that any increase in the demands of the major consumers would be reflected immediately in steel production. For this reason the almost certain gain in automotive steel requirements next month is calculated to offset the normal seasonal decline in miscellaneous consumption prompted by inventory retrenchment, and steel production in December may not fall much below recent low levels.

Steel ingot production in the Pittsburgh district this week has declined to about 28 per cent of capacity, as compared with 30 per cent in the last three weeks. Curtailment is reported by practically all of the large independent producers. Suspension of open-hearth activity at some plants because of the holiday may bring production to an even lower rate. Valley mills are also off slightly, and a steel-works blast furnace has been blown out. Activity in the Wheeling district is a shade higher, particularly in the case of finishing mills.

Heavier purchases by automobile industry expected to revive dropping steel production.

* * *

Ingot operating rate at Pittsburgh declines to 28 per cent following three weeks of 30 per cent rate.

* * *

Recent slight increases largely sustained by hand-to-mouth orders of miscellaneous consumers.

* * *

Any increase in demands of major consuming lines would be quickly reflected in steel production.

* * *

Steel scrap weak.

▼ ▼ ▼

Prices are subject to test in the Detroit district, where automobile buying for first quarter shipment is getting under way. Producers have made no public announcement of first quarter prices, but advances are unlikely. On the heavy hot-rolled products, little test of current quotations is offered by small-lot purchases, although structural shapes are admittedly weak. On flat-rolled products, weakness is apparent only in automobile body sheets.

Pig Iron

Some sellers of pig iron report a slight contraction in the requirements of local foundries, and new buying is still generally lacking in the district. Sales are confined principally to car-load lots, and the foundry grade is the only one on which current sales establish prices clearly. Foundry, malleable and Bessemer iron are quoted at \$17, Pittsburgh furnace, while Valley producers are quoting \$16, furnace, on foundry, and \$16.50 on malleable and Bessemer. Basic quotations are nominal in the absence of significant buying.

The Neville Island furnace of the Davison Coke & Iron Co. has been banked, but one of the Shenango stacks in the Valleys will be blown in next week.

CURRENT MARKET PRICES FOR
STEEL, PIG IRON AND OLD MA-
TERIAL WILL BE FOUND ON PAGES
1404 TO 1408, INCLUSIVE

Semi-Finished Steel

While new buying of billets, slabs and sheet bars is generally lacking, shipments have gained slightly in the last week or two, reflecting better operations on the part of sheet and strip makers. Prices are unchanged. Wire rods are rather dull, the month having shown scarcely any improvement over October.

Rails and Track Accessories

The dullness of this market has been accentuated in the last week by the failure of railroad executives to reach an agreement with the union heads regarding wages. No active rail inquiry is before the trade, and accessories are equally dull. The local rail mill continues to operate at recent levels.

Bolts, Nuts and Rivets

Scarcely any improvement in tonnage is noticeable, and the releases of some makers are falling below the October average. The price situation shows little change, but is somewhat more uniform with respect to bolts, which are generally available to car-load and larger buyers at 70, 10 and 10 per cent off list. Rivet prices are better held on both large and small sizes.

Bars, Plates and Shapes

Buying of steel for car repairs by two railroads is practically the only feature of the market for heavy hot-rolled products. The Chesapeake & Ohio is expected to close this week on approximately 4000 tons of plates and shapes for car repairs, and the Norfolk & Western has ordered 1000 tons for repairs to cars and building of locomotive tenders. No other railroad business of consequence is in the market at this time. With the exception of the Pittsburgh Post Office, no substantial structural tonnage is coming out in this territory. Bids on that building will be taken Dec. 15, and it is now estimated that 10,000 tons of shapes will be needed. Reinforcing bar tonnage is also light, and shipments are being completed on projects placed earlier in the year. The volume of barge inquiry before the trade is still encouraging, but nothing definite regarding purchases can be ascertained. Automobile and parts makers have placed some bar tonnage with local mills in the last week or two, and additional business may follow in the next few days. Prices are gen-

erally holding at 1.60c., Pittsburgh, on small lots of bars, plates or shapes, but this quotation applies to little business on structural shapes.

Cold Finished Steel Bars

Increased releases from the automobile industry have stimulated the cold-finished market, but not sufficiently to boost operations to any noticeable extent. The price is generally steady at 2.10c., Pittsburgh.

Tubular Goods

Revival of interest in a pipe line extension for the Continental Construction Corp., Chicago, extending from Geneseo, Ill., to Milwaukee, has been the feature of the market in the last week. Approximately 23,000 tons of 20-in. pipe will be required, but there is no assurance that the material will be delivered immediately. Several other line pipe projects are before the trade, but are in such a nebulous stage of negotiation that no promise of award before next spring can be made. Pipe business otherwise is rather dull, although there has been some improvement in demand for mechanical tubing going to automobile and parts makers. Oil country business is very quiet, and stocks in the mid-continent fields are large, considering the low state of demand. Standard pipe is holding its own in a rather dull market.

Wire Products

Following some improvement earlier in the month, the wire business has again lapsed into dullness, with a slight betterment in movement of manufacturers' wire the only favorable feature. Demand for merchant wire products from jobbers in the South and Southwest has again fallen off, and no further improvement can be expected before the first of the year with inventory taking so near. Prices are still well held.

Sheets

Releases from the automobile industry last week were the best in some time, and further improvement is expected this week. As a result, production held at about 30 per cent of capacity, with some promise of a further gain this week. However, mills that might have run four or five days will suspend schedules Wednesday evening, and may not resume production before Monday. Full-finishing units have been averaging much higher than jobbing mills, the latter having been doing less than 25 per cent. Prices on the ordinary finishes are well maintained, but automobile body sheets are rather weak. Several large inquiries from automobile companies are before the trade at present, and are likely to be closed this week. While some of these include coverage for the entire first quarter, others call for January requirements only. It is believed that present quotations will be made in most cases, and that mills will avoid

a formal announcement regarding first quarter prices as long as possible. An advance seems rather unlikely.

Tin Plate

Operations are well maintained largely because of anticipated tonnage being rolled by the larger producers. Current releases are light, and first-half contracting is still lagging.

Strip Steel

Specifications showed a moderate improvement last week, and mill schedules this week are considerably better. On hot-rolled material schedules average about 30 per cent of capacity, although cold-rolling units are not so active. Most of the improvement in releases may be traced to the automobile industry, which is also inquiring for first quarter tonnage. Prices on forward buying are not clearly defined, although one maker expects to advance prices \$1 a ton on hot-rolled material, and \$2 on cold-rolled.

Coal and Coke

Demand for foundry coke has declined, and the furnace grade is still very dull. Lack of cold weather con-

tinues to depress the market on heating coke. Coal is quiet for the same reason. Slack prices are slightly stronger than they were a short time ago.

Old Material

The scrap market continues rather weak, as dealers generally are willing to sell heavy melting steel in small lots to a large consumer in the district at \$10.25. Another buyer is reported to have paid \$10.50 or more for selected railroad scrap, which is rather scarce in this locality. One small sale into consumption at as low as \$10 is also reported, but dealers are unable to buy scrap for less than this, and the range of the market appears to be \$10 to \$10.25. A sale of hydraulic bundles at \$10 represents a decline of 25c. a ton from the last purchase reported. Blast furnace scrap has been sold at \$7.25, representing a similar decline. Specialties are weak, as consumers are showing no interest in purchases.

The monthly list of the Pennsylvania Railroad, on which bids are to be opened Dec. 2, contains 18,000 tons of scrap, including 4500 tons of car-wheels, but less than 2000 tons of No. 1 heavy melting steel.

Valley Mills Expect to Benefit from Orders Soon to Be Placed by Automobile Industry

YOUNGSTOWN, Nov. 24.—The Valley steel industry, whose finishing capacity runs largely to the flat-rolled steels used by the automobile industry, expects to benefit shortly from releases of orders by the automobile companies. More business in sheets and strip steel is said to be developing than has been seen in many months.

Production schedules this week will be broken by the Thanksgiving holiday. Twenty-four of 68 open-hearth furnaces are in service, and the three Bessemer plants in this district are running part time. Independ-

dent companies will use 17 of 53 open-hearths this week, against 20 last week, and Carnegie Steel Co. will continue with seven of its 15 furnaces at the Ohio works.

Republic Steel Corp. has a crew of men repairing five open-hearth furnaces at its Youngstown plant that have been idle for about a year. Republic has arranged with the United States Government for the operation of two open-hearths that were built at the Youngstown plant during the war. This will give Republic 23 serviceable open-hearths, of which 15 are at its Lansingville plant in Youngstown and eight at Warren.

Cincinnati Pig Iron Shipments Gain

CINCINNATI, Nov. 24.—The small increase in the foundry melt noted a week ago was reflected in an improvement in shipments against pig iron contracts. In some quarters this increase was reported to be about 25 per cent, but the average did not reach this figure. New business of the week totaled 1300 tons, most of which represented immediate requirements of melters. Recent developments have served to bring the quotation on Northern iron, delivered in Cincinnati, to \$17.90, although outside of the metropolitan area shading of prices to obtain business has been reported. Southern quotations have

been well maintained on current orders, although there have been no substantial tonnages to test the price. A central Ohio consumer purchased 300 tons of Northern foundry iron, and a south central Ohio melter took 100 tons of Southern iron.

Warehouse Business

A slight increase in jobbing tonnage this month over last month has been noted, contrary to the usual seasonal trend. Quotations are unchanged.

Old Material

Demand is without feature although some mills are accepting a little turnings and blast furnace scrap on contract.

Chicago District Steel Production

Not Lifted by Spotty Gains

CHICAGO, Nov. 24. — Slight changes here and there are giving encouragement to steel producers in spite of the nearness of the year end, when business usually turns very quiet. Reports are persistent that automobile manufacturers are moving rather fast in arranging commitments for steel needs. The Chicago bar market is more active than in five months, and the background of the plate market is improved. Railroad car rebuilding programs that have been in progress will be continued and several new schedules are in the making. Unfortunately the tonnage of steel used in building construction is not holding up, with the result that gains in other directions are offset, and ingot production still holds close to 22 per cent of capacity.

Opinions are varied as to the trend of production between now and Jan. 1. Probably the most common thought is that the usual year-end drop will occur, and yet others, taking into account low inventories, visualize a condition wherein the downward trend will be materially retarded. The latter tendency is quite evident in warehouse business, which is still holding relatively steady at a time when a drop is expected. It is worth noting that warehouse shipments to cities are lower, but needs of agricultural districts are climbing slowly.

Blast furnace operations at Joliet are on somewhat a more stable basis, but at another steel mill ingot output is lower than blast furnace production, with the result that rather large quantities of pig iron are being piled.

November shipments of Northern pig iron to the merchant trade show a 20 per cent gain over those of the preceding month. The future course of this market is uncertain, with few releases now at hand for December delivery.

Pig Iron

November shipments are fully 20 per cent ahead of October's, but the trend is uncertain for the coming month. Here and there are indications that specifications will hold fairly well, but releases at hand for delivery next month are few in number. Local producers are still holding to \$17 a ton, furnace, but the threat of additional boat shipments, such as disturbed the market a week ago, is not out of the picture. A cargo of silvery has been received at a local dock and

Though spotty improvement is noticeable, the trend is not strong.

* * *

Ingot operations for district not above 22 per cent for second week.

* * *

Bar orders the best in five months, and background of plate market is slightly improved.

* * *

November pig iron shipments 20 per cent larger than those of October, but December outlook is uncertain.

▼ ▼ ▼

another boatload is due in a few days. Prices for charcoal iron are weak. The general market level now is \$22 a ton, furnace, or \$25.04, delivered Chicago.

Ferroalloys

Transactions are limited to a few small scattered lots as both buyers and sellers await announcements of new contract prices.

Fluorspar

The movement of this commodity is light. Most quotations are going out at \$13, Illinois mines.

Bolts, Nuts and Rivets

November is closing with shipments lower than in the preceding month. Stove bolts have been advanced to 80, 25 and 10 per cent off list, with the usual 2½ per cent off list in bulk.

Coke

Contracting for next year is making satisfactory progress. Prices for by-product foundry coke remain steady at \$7.50 a ton, local ovens.

Wire Products

Last week's condition of this market still holds, with the exception that automobile manufacturers are taking prices on needs of the next few months. Prices to miscellaneous buyers are steady, with tests promised by the automobile trade. It is in the minds of some producers to announce first quarter prices about Dec. 1. Reports as to conditions in agricultural districts, particularly in the South-

west, are distinctly encouraging to wire producers. The wire mesh movement is near the end as the paving season closes. Producers are beginning to think of the future market for this product for the reason that they cannot expect paving programs to hold to the size of 1931.

Reinforcing Bars

A few new inquiries are making their appearance, but the aggregate tonnage is below expectations for this time of year. Bids will be opened on 5000 tons for river improvement work at Rock Island, Ill., but the trade doubts if any of this tonnage will be let before next spring. Open weather still permits road construction, and contractors are beginning to call for bars for new bridges on which work will be continued for some time. Prices of reinforcing bars are weak.

Cast Iron Pipe

Fresh inquiries and awards remain light, and competition on a price basis is severe. Transactions in the immediate Chicago territory are extremely few and small in size, with immediate shipment expected. Central Foundry Co. has taken 18,000 ft. of 8-in. pipe for Dearborn, Mich., where American Cast Iron Pipe Co. is low on another tonnage. Milan, Ind., is inquiring for 125 tons. Word comes from Bethel, Ohio, that 350 tons wanted there will not again be advertised until bonds have been sold. Open weather in the Chicago area is permitting pipe laying operations later in the season than usual without added cost.

Structural Material

Another week has passed, leaving fabricators with little about which to be cheerful. Here and there a small tonnage has been placed, but fresh inquiries are extremely scarce. Business from the railroads is almost at a standstill, with the exception that several small tonnages are being sought for bridge repair work. Deliveries by shops are well in excess of new orders, thereby pointing to a still lower rate of output.

Sheets

Demand is somewhat more variable, and hot mills are finding more difficulty in maintaining production at 25 per cent. In fact, an estimate of output is difficult to make because of the rather wide fluctuations that occur

within each seven-day period. The roofing trade, which a week to 10 days ago started a drive to sell for spring delivery, is finding response rather indifferent.

The indications are that the hot mills at Milwaukee will remain out of service until there is a measurable improvement in demand. Throughout the summer and fall these units have been operated at short intervals, but it is now understood that only a skeleton organization is being held there.

Rails and Track Supplies

This market is extremely dull. However, there is a bright side to the situation in that a number of Western railroads are somewhat more liberal in specifying against contracts entered for delivery in 1931. This will have the effect of reducing the carry-over tonnage which in August appeared quite impressive. The Burlington is expected to enter the market for 35,000 tons of rails and about 12,000 tons of track fastenings. This inquiry may be held over until the new year.

Plates

This market is more promising. A 12-in. pipe line is contemplated in the Southwest; Denver, Colo., will need 1000 tons of steel pipe; a gas holder calls for 450 tons of plates, and Evanston, Ill., has ordered a water tank requiring 450 tons. The Northern Pacific has sent out definite inquiries for 150 hopper cars, requiring about 1500 tons of steel, and the Illinois Central has a program for reconditioning 400 coal cars each month. The Burlington also has a repair program under way. Prices lack strength.

Bars

Specifications for bars are the largest in five months, but the margin of gain is small. Automobile and parts manufacturers are largely responsible for this change, though farm equipment makers are also playing rather an important part. There is also included in this week's business some forging bar tonnage, and screw and bolt manufacturers are taking more steel. Individual orders are still rather small, but the aggregate tonnage sent to mills is a distinct aid to rolling schedules.

Warehouse Business

Demand from cities continues to drop, but country users are taking larger quantities, with the net result that the total movement from warehouses has been fairly steady throughout the month. This is taken as a favorable condition by warehousemen.

Old Material

Prices are leaning rather decidedly toward the weak side in a market that has once again turned dull. Railroads continue to attempt to merchandise scrap, their asking prices being sometimes more than \$1 a ton above what consumers last paid. The result is

that little railroad scrap is coming out on track. This relieves what might otherwise be an acute condition, with one large mill consumer

virtually out of the market. Another cargo of cast iron borings will move from Chicago to Lake Erie before the end of the month.

Golden Gate Bridge Indefinitely Postponed Because of Delay of Supreme Court Decision

SAN FRANCISCO, Nov. 23.—Because of delay by the California Supreme Court in rendering its decision on the legality of the initial \$6,000,000 bond issue for the Golden Gate bridge, the time limit has expired for the bid by a group of bond buyers. Therefore the directors have returned the guarantee check, and will make no further effort to sell bonds until a decision has been handed down, not sooner than a month hence. Contracts for about 110,000 tons of steel provisionally let in July were dependent upon a favorable legal decision within six months.

Definite contracts were let during the week for over 3500 tons of steel on open specifications for major projects, with new inquiries for approximately a like amount. Central and northern California seem more active than southern California or the Pacific Northwest. The tone of the trade is improving gradually as many postponed projects seem likely to mature within the next few months.

New England Pig Iron Demand More Active

BOSTON, Nov. 24.—Pig iron sales approximated 1500 tons, or about 50 per cent more than for the previous week. All sales were in small lots, mostly for prompt shipment, but some with deliveries running into the first quarter. They included 900 tons of Mystic iron at an average price of \$18.94 a ton, furnace. There are no sizable inquiries in the market, and no prospects of any the remainder of 1931. No increase in the New England melt is reported.

Coke

New England by-product foundry coke ovens have opened their books for first half. Approximately 90 per cent of regular consumers have contracted.

Reinforcing Steel

More life is shown in the reinforcing steel market, but business is far from active. Sales the past week approximated 575 tons, including one 175-ton lot and one of 100 tons. New prospects include 600 tons of rail steel bars and 75 tons of billet for Massachusetts road and bridge work, 600 tons for a State office building, and 350 tons in two smaller projects.

Finished Steel

Lettings of reinforcing bars total more than 700 tons, with 300 tons of new inquiries. This department of the market is less active than a month ago. About 2300 tons of shapes were placed, with 1300 tons in new projects. About 600 tons of plates were involved in closed contracts, with over 2000 tons called for in new inquiries.

Sacramento, Cal., will vote on a \$10,800,000 bond issue on Dec. 16 for a mountain water supply which would involve 60 miles of 45 to 63-in. pipe. Seattle is considering a \$500,000 bond issue for a water system to serve its southern section involving pipe and a 1,000,000-gal. standpipe. For a contemplated Beacon Avenue pipe line in the same city, 1000 tons of plates would be required.

Cast Iron Pipe

Oakland, Cal., will open bids Dec. 3 on 1200 tons of 4 to 8-in. pipe. Public awards for the week total 300 tons, with new inquiries for a like amount, in addition to the Oakland requirement.

Within a month a Boston school, and three State hospital jobs should be out for figuring, involving several hundred tons of steel.

Old Material

Moderate activity in rails for rerolling has featured an otherwise rather drab old material market. Prices on rails for rerolling are considerably lower than they were a fortnight ago, but the drop has stimulated business. Among recent sales, that of 3000 tons by the American Steel & Iron Co., Boston, to an Eastern mill was the outstanding transaction. The Boston company has purchased the 40-mile roadbed of the Glenfield & Western Railroad Corp., Glenfield, N. H., which should yield 4500 to 5000 tons of rerolling rails in addition to a sizable tonnage of relaying rails and miscellaneous scrap. Taking up of the rails has been deferred until spring. Otherwise old material business is confined to scattered distress car lots of material, principally heavy melting steel, steel mill borings, bundled skeleton, chemical borings and heavy cast.

Pratt & Whitney Co. of Massachusetts has moved from 75 Battery March Street, Boston, to 161 Brookline Avenue.

Cleveland Mills Receive New Releases for Automobiles

Automotive Tonnage Expected This Week from Ford Motor Co.
—Ingot Operating Rate Off Slightly

CLEVELAND, Nov. 24.—The principal source of encouragement in the steel industry is found in new releases from motor car manufacturers and the expectation that the long looked-for business from the Ford Motor Co. is about to be placed. However, actual tonnage booked the past week was less in volume than during some of the previous weeks.

Steel plant operations in Cleveland declined two points this week through the shutting down of one open-hearth furnace, and the industry is now operating locally at 38 per cent of ingot capacity.

The Ford Motor Co. plans the manufacture of 300,000 cars during the first quarter, according to information given by that company to some of its regular sources of supply of various materials, and is expected to place a round tonnage of sheets and strip steel this week. Latest reports are that this company will start its assembly line on its new models Dec. 15. More activity on the part of other automobile companies is indicated by the placing of substantial orders for automobile forgings in this territory.

Demand for steel from sources outside of the motor car field is light, orders being small and limited to early needs. While sentiment generally is better, in few cases has there been an increase in operations by metalworking plants not affiliated with the automotive industry.

Sheet prices, after holding fairly steady for months, show signs of weakness that seems to have resulted from eagerness of some producers to take business. Enameling sheets have been reduced \$3 a ton. Hot and cold-rolled strip appear to have definitely settled down to the lower quotation in the recent price spread. Stove bolts have been advanced 5 per cent.

Pig Iron

One Lake furnace sold over 3000 tons in small lots during the week to cover requirements in December and into the first quarter. In the Cleveland territory there was virtually no activity. There has not been much gain in the demand from foundries in the automotive field. Most buyers are restricting purchases to early needs. Prices are unchanged at \$15.50 to \$16, Lake furnace, for foundry and malleable iron for this territory and \$16.50 to \$17 for northern Indiana and Michigan shipment. For local delivery, \$17, furnace, is quoted, but this price is untested.

Bars, Plates and Shapes

With the placing of most of the steel for local municipal jobs, activity in the construction field has quieted down. The award of 800 tons of structural steel for the Cleveland sewage disposal plant has been made, and 2400 tons is about to be placed for the Cleveland exhibition hall. Additional State bridge work will take 200 tons. Conversion of a Lake freight boat into an unloading vessel will require 3000 tons of plates. Demand for merchant bars is lighter than early in the month. Prices appear steady at 1.65c., Cleveland, for steel bars and 1.60c., Pittsburgh, for plates and shapes.

Strip Steel

The hot-rolled strip market appears to have definitely settled to 1.50c., Pittsburgh, for wide and 1.60c. for narrow material, although some small lots are bringing \$1 a ton higher. On cold-rolled strip, 2.05c., Cleveland, has become the more common quotation except for small lots. Fender stock seems to have settled down to 3.10c., Cleveland, and there are reports that this price has been shaded. Business, while not good, is better than a few weeks ago. A good tonnage of hot-

rolled strip is pending for automobile running boards.

Sheets

Enameling sheets have been reduced \$3 a ton to 3.25c., Pittsburgh, for No. 20 gage and reports indicate some weakness in other grades, although most mills are showing no inclination to deviate from the prices that have prevailed for some time. While demand shows some gain from stamping plants doing automotive work, orders generally are for small lots.

Bolts, Nuts and Rivets

An advance on stove bolts effective Nov. 23 is announced by leading manufacturers, who state that recent prices have been below cost of production. The new price is 80, 25 and 10 per cent discount for packages. The recent regular quotation of 85, 10 and 5 per cent has been shaded recently about as much as the regular bolt and nut discount. The 73, 10 and 10 discount on bolts and nuts generally applies to jobbers and large consumers, and there has been some shading of this discount. Business is still slow, with plant operations at about 25 per cent of capacity. Demand for rivets has improved slightly, and regular prices are being well maintained.

Old Material

Purchases of No. 1 heavy melting steel are being made at \$7.50 to \$7.75 by a dealer for shipment to a local mill. Drop forge flashings are bringing locally \$6 for shipment to the Pittsburgh district. Two Valley mills cut down shipments this week. Very little new demand is expected from consumers during the rest of the year.

Steel Operations at Buffalo Off This Week; Pig Iron Sales Are Mostly in Small Lots

BUFFALO, Nov. 24.—The Lackawanna plant of Bethlehem Steel has dropped its open-hearth operation from eight to seven units, but there is a prospect of a return to eight before the end of this week. Republic Steel, on its alternate week schedule, is idle this week. Wickwire Spencer is operating three furnaces. The Seneca Iron & Steel Co. is running at about 45 per cent, and the Buffalo Bolt Co. between 25 and 30 per cent.

Pig Iron

Not much change is noted in the pig iron situation this week. Ordering is a little slower, though 3000 to 3500 tons was placed in small lots. Prospective closing of navigation on the barge canal Nov. 30 has stirred up a slightly better volume of business in the East.

Old Material

Except for some sales of No. 1 heavy melting steel at \$8.50, the mar-

ket is quiet. One of the principal consumers has an agreement to purchase a considerable tonnage at \$8.50 as soon as the present suspension on shipments is lifted. There is a strong demand for stove plate, and in some cases as much as \$8.50 is being offered by a dealer. This grade is scarce. There is a fair demand for No. 1 machinery cast.

Detroit Scrap Market Has Slight Reaction

DETROIT, Nov. 24.—There has been a slight reaction from the recent spirit of buoyancy in the local scrap market, with a growing conviction on the part of dealers that little buying will develop until January. Aside from weakness in borings and turnings, prices are firm.

Eastern Pennsylvania Ingot Production Lower This Week

One Structural Mill Shut Down—Average Rate for District Not Much Above 20 Per Cent

PHILADELPHIA, Nov. 24.—A holiday this week and the low state of activity in structural shapes and plates, which comprise a large part of the eastern Pennsylvania finishing capacity, have brought ingot production to a lower level. One structural mill is shut down for the entire week, and other mills are on very small schedules. Although the average rate of the Bethlehem Steel Co. in all of its plants is about 34 per cent, the rate for the eastern Pennsylvania district for all companies is not much, if any, above 20 per cent.

Sheets continue slightly more active than other steel products, and additional purchases for automobile body building are expected before the end of the year. Hot-rolled sheet prices are being maintained, but some lack of strength is evident in galvanized material, jobbers being able to buy at \$2 a ton concessions, or 2.80c. a lb., Pittsburgh, for their own stocks. A rolling mill, which will begin the manufacture of galvanized sheets about the first of the year, is taking orders for future delivery.

Recent steel orders include about 150 tons of light plates for welded machine housing, placed by a Lebanon, Pa., sheet metal works for the Philadelphia Electric Co. The Reading Co. is altering and adding to its coal pockets and buildings at Ninth and Berks Streets, Philadelphia. Bids will be opened Dec. 18 on Government work at Rock Island, Ill., which includes about 1800 tons of steel plate work in a rolling dam and a tonnage of sheet piling and structural shapes.

Pig Iron

Following a brief period of active foundry iron buying at lowered prices, business has declined to occasional carload lots, most consumers being well covered for the rest of the year. Recent quotations on both No. 2 and No. 2X foundry iron indicate the market is still quotable at \$14.75 to \$15 a ton, base, furnace. Foreign foundry iron is being offered to consumers here, and a small tonnage of orders has been taken. A cargo of Dutch pig iron is understood to be on the way to the United States.

Steel Bars

Prices are firmly maintained at 1.60c., Pittsburgh, or 1.89c., delivered Philadelphia, but buying is slightly smaller than in the previous two weeks. Reinforcing bars are quoted at 1.60c., Pittsburgh, or 1.89c., Philadelphia, with concessions of \$1 and \$2 a ton on desirable projects. About

200 tons of reinforcing bars have been placed for the coal breaker of the Philadelphia & Reading Coal & Iron Co. at St. Nicholas, Pa., 150 tons for foundations of the new Philadelphia Post Office and 650 tons for a veterans home at Columbia, S. C.

Sheets and Strip

The prices for hot and cold-rolled strip steel have generally settled to 1.50c. and 2.05c., base, respectively. Hot-rolled sheet prices are being maintained, but the differential of \$2 a ton, customarily granted to the jobber on sales for direct shipment from the mill is extending to his purchases for warehouse stocks. Automobile body builders are expected to place further orders for sheets before the end of this year. Meanwhile, stove makers in this district, which have been operating at good rates for some months, are beginning to taper off production, and radio manufacturers

show no intention of increasing their output.

Shapes and Plates

Fabricators of both plates and shapes are specifying only small miscellaneous lots of material for prompt shipment. Shapes are generally quoted at 1.65c., f.o.b. nearest mill to consumer, or 1.69½c., Philadelphia, with concessions of \$1 a ton on medium-sized lots. The plate market is fairly well maintained at 1.70c., Coatesville, Pa., or 1.78½c., Philadelphia, for the orders of under a carload, which make up most of the present business. On larger tonnages of plates a concession of \$1 a ton is not uncommon.

Imports

In the week ended Nov. 21, arrivals at this port consisted of nine tons of bearing bars from Sweden and the following products from Belgium: 171 tons of structural shapes, 82 tons of steel bars, 82 tons of iron slabs and four tons of steel bands.

Old Material

All grades of iron and steel scrap are extremely quiet, and prices lack firmness. Consumers of No. 1 and No. 2 heavy melting steel are requesting postponement of deliveries on their contracts.

Birmingham Steel Buying Holds at Recent Rate; Pig Iron Orders Still on Hand-to-Mouth Basis

BIRMINGHAM, Nov. 24.—Current steel bookings and inquiries of one company continue to hold to the level of the past three weeks. Sheets have been the most active item. Plate demand has been weak, largely on account of conditions in the oil fields. Railroads have been buying more freely for their current monthly requirements. Additional rail orders amounting to approximately 8700 tons are reported here. No plans have yet been announced for the reopening of the Ensley rail mill of the Tennessee company, and it is now thought that this will be delayed until after the first of the year. Demand for wire products is at a fair rate, which has been maintained for several weeks. Structural steel fabricators are booking very little new tonnage.

Open-hearth operations continue to vary. Last week the Tennessee company's schedule ranged from four to six open-hearths at Fairfield, while Gulf States Steel operated three. This week Gulf States Steel will close down its plant, with the probability of resuming next week.

Pig Iron

There is no change in the pig iron situation. The larger melters, with a few exceptions, continue to buy

only a week or so in advance, while the smaller ones are irregular, ordering a car at a time as needed. No improvement is reported either in bookings or shipments. Quotations for district deliveries remain on a \$12 base. Six furnaces are in blast, five on foundry iron and one on basic. Shipments of companies are running behind output, while another is keeping just ahead of it.

Cast Iron Pipe

Washington plans to open bids on 3000 tons this week, while Memphis will also open bids on about 900 tons. Dearborn, Mich., has 500 tons pending; Oakland, Cal., 500 tons, and Pasadena, Cal., 400 tons. Recent awards include 300 tons for Columbia, Ill., placed with McWane Cast Iron Pipe Co.; 200 tons for the Panama Canal Zone, placed with the American Cast Iron Pipe Co., and 200 tons for Atlanta, placed with the United States Pipe & Foundry. Other current tonnage is coming in small lots. Plant operations remain around 30 per cent. Base quotations have been lowered to \$32 to \$33.

Old Material

Activity is at a low point. Only a small amount of new tonnage is being booked. Prices are unchanged.

New York Steel Business Has Gained Slightly This Month

Structural Shapes and Plates Are Exceptions in Mild Improvement—Tin Plate Orders Increasing

NEW YORK, Nov. 24.—While nearly all local steel companies sales offices will be able to report a slight increase in aggregate tonnage this month as compared with October, the gain has been slight and has not affected all products. Structural shapes and plates seem to be conspicuous exceptions. The week's business has included a fairly good amount of tin plate for early rolling, but for shipment in January or later. However, a few tin plate orders were for December shipment.

With the approach of the first quarter, there is renewed interest in prices. Vitreous enameling sheets have been reduced \$3 a ton, and there are signs of weakness in galvanized sheets in that some jobbers appear to have been able to buy at 2.80c., Pittsburgh, for stocks, whereas this price was supposed to apply only on jobbers' direct shipment from mills. Concessions on structural shapes and plates are developed by the larger buyers, but the general run of orders commands published quotations.

There is some interest in tin plate inquiries from Japan, but doubt that American mills can secure the business in competition with low prices of German and Welsh makers, which would necessitate quotations of less than \$3 a base box, Pittsburgh, to meet the low European quotations. An inquiry for 8000 tons of seamless steel pipe has come from the Argentine, but the business may go to Europe.

Pig Iron

Demand for pig iron in the local district is virtually dormant. No large tonnages are up for negotiation, and carlot specifications are scattered. Active solicitation by sellers has developed little prospect of any improvement in demand during the remainder of the year. Sales for the week aggregated about 3500 tons, compared with 5000 tons the preceding week and 4000 tons two weeks ago. The Worthington Pump & Machinery Corp., has closed against its recent inquiry for 475 tons of foundry and Bessemer iron for delivery extending into first quarter to its Harrison, N. J., plant.

With pending business restricted to a few small lots, prices are untested. Buffalo iron for delivery in northern New Jersey is quotable at \$14.50 to \$15, furnace, while eastern Pennsylvania iron is being offered in that district at delivered prices level with those applying on Buffalo brands.

Southern iron is still held at \$11, Birmingham.

Cast Iron Pipe

Among new inquiries which appeared in the past week are 3500 tons of various sizes, representing the 1932 requirements for the Washington suburban sanitary district; 1450 tons of 24 and 30-in. for Memphis, Tenn.; 250 tons of 14 and 20-in. for sewer projects in Westchester County, N. Y., and 100 tons of 18 and 24-in. for a sewer at Paxtang, Pa. The United States Pipe & Foundry Co. was awarded 300 tons of sizes up to 24-in. for Princeton, N. J.; 360 tons of 4 to 8-in. for Department of Water Supply, Gas and Electricity, New

St. Louis Scrap Prices in Sharp Decline

ST. LOUIS, Nov. 24.—The only interest so far manifested in first quarter pig iron requirements is by manufacturers of implements and foundries supplying that industry, but that interest is mild and has not reached the buying stage. Prices are firm.

Finished Steel

Open-hearth operations in the St. Louis district continue at about 14 per cent of capacity, with no increase likely soon.

Award of 2000 tons of structural steel for the North American Building has been made to the Mississippi Valley Structural Steel Co. Stupp Brothers Bridge & Iron Co. has been awarded 800 tons for towers and trestles for the Madden Dam in the Panama Canal Zone.

Warehouse business has shown an encouraging pick-up during November. The gain has been mostly in structural steel.

Old Material

An East Side steel mill bought a limited tonnage of heavy melting steel at 75c. to \$1 a ton less than the price of its preceding purchase, which was made last August, and this was the only transaction worthy of note during the week. Selected heavy melting steel and No. 2 railroad wrought are 25c. off, and stove plate is 50c. less. Railroad offerings of scrap iron still are small. The Louisville & Nashville and Chicago, Burlington & Quincy withdrew their offerings of the week from the market. Country

York, and 200 tons for University of New Hampshire, Durham, N. H. Syracuse, N. Y., placed 600 tons of 20 and 24-in. with R. D. Wood & Co., and Lawrence, Mass., purchased 190 tons of 24 and 30-in. from Donaldson Iron Works.

Reinforcing Bars

Prices are nominally unchanged at 1.60c., Pittsburgh, or 1.93c., delivered New York. With the exception of the New York State Hospital at Poughkeepsie, N. Y., which will require about 450 tons of bars, new projects that came up for figuring in the past week involved less than carload lots.

Old Material

Deliveries of heavy melting steel to eastern Pennsylvania consumers are temporarily postponed, except for a small tonnage being accepted by the consumer at Conshohocken, Pa. No. 1 steel is being bought at \$5.50 a ton, and No. 2 at \$4.50 a ton, on barge in New York harbor, for shipment to Buffalo when navigation opens in the spring. Brokers filling heavy breakable cast scrap contracts are paying \$9, delivered eastern Pennsylvania, and \$8.50, Florence, N. J.

shipments are still restricted to distress scrap. Railroad lists before the market follow: International-Great Northern, 1800 tons; Alton, 800 tons; New York, Chicago & St. Louis, 28 carloads, and Nashville, Chattanooga & St. Louis, nine carloads.

Canadian Business Has Better Undertone

TORONTO, Nov. 24.—While there is steadily brightening undertone in general business conditions in this country, there has been little definite change in the demand for raw materials. A slight improvement was noted in sales of merchant pig iron during the week, but this was due to a larger number of buyers and not to increases in individual orders. Algoma Steel Corp. has blown in its No. 1 blast furnace, which has been idle for about three months. Pig iron prices are unchanged.

Structural Steel

No large contracts were included in the week's business, but several orders ranging from 100 to 500 tons were booked. In recent weeks a better demand for steel for building has developed. Bridge work is still furnishing a good demand for steel.

Old Material

A few orders were closed for iron grades during the week, but all were for small quantities and spot delivery. No. 1 machinery continues to be most active on the list, although stove plate showed some renewed activity. The demand for steel scrap is negligible.

Lake Superior Ore Shipments 23,467,786 Tons in 1931

A Decline of 49.62 Per Cent from 1930 and the Smallest, Excepting 1921, Since 1904

SHIPMENTS of Lake Superior ore by water were 23,467,786 gross tons during the 1931 shipping season, which closed with the movement of the last cargoes at the end of last week. Shipments during November were only 420,594 tons. The movement, as compared with the previous year, showed a falling off of 23,115,196 tons, or 49.62 per cent.

The peak in the movement of Lake Superior ore by water was in 1929, when 65,195,595 tons was shipped. In 1930, with the period of depression under way, water shipments declined more than 18,000,000 tons, or 28.56 per cent, and the falling off this year has been much greater. Water shipments this year were the lightest since 1904, except during the 1921 period of depression, when they got down to 21,300,726 tons.

Consuming interests, when faced with a further downward trend in the steel industry, cut deeply into their ore shipping schedules early this year

and, as a result, in spite of the light consumption the past few months, ore stocks at furnaces and Lake Erie docks at the close of the season of navigation this year, although still excessive, are around 2,000,000 tons less than at the same time a year ago.

Shipments by ports by water for November for the entire year and for 1930 and total water shipments for 10 years are listed below:

Lake Ore Shipments by Water, Gross Tons			
	November	Season 1931	Season 1930
Escanaba	71,588	1,608,044	4,096,813
Marquette	116,379	1,622,524	2,961,670
Ashland	34,785	2,908,159	5,061,374
Superior	197,842	6,737,063	14,153,553
Duluth .....	.....	7,267,023	14,001,327
Two Harbors.....	.....	3,324,973	6,308,245
Total	420,594	23,467,786	46,582,982
1931 decrease.....	.....	23,115,196	.....

Water Shipments of Last 10 Years, Gross Tons			
1922.....	42,613,229	1927.....	51,107,136
1923.....	59,036,705	1928.....	53,980,874
1924.....	42,623,572	1929.....	65,204,600
1925.....	54,081,298	1930.....	46,582,982
1926.....	58,537,855	1931.....	23,467,786

Appointed Sales Agents for 12 Fluorspar Mines

Oglebay, Norton & Co., Cleveland, for some years factors in the domestic fluorspar trade, as sales agents for an Illinois producer, have greatly extended their activities by acquiring sales agencies for 12 more producers in the central field of southern Illinois and western Kentucky, where nearly all the domestic fluorspar consumed in this country is mined. They are now exclusive sales agents for the Crystal Fluorspar Co., Eagle Fluorspar Co., Gugenheim Mining Co., Haynes Fluorspar Co., Henry & Frazer, Hillside Fluorspar Mines, Klondyke Fluorspar Corp'n., Kentucky Fluorspar Co., Knight & Clark, McMaster & Hunter Fluorspar Co., Roberts & Frazer, Rosiclare Lead & Fluorspar Mining Co., and the Victory Fluorspar Mining Co.

Open-Hearth Men Meeting in Detroit

About 100 men interested in problems incident to making open-hearth steel met Nov. 24, at the Book-Cadillac Hotel, Detroit, for the fourteenth semi-annual meeting of the Open-Hearth Committee, American Institute of Mining and Metallurgical Engineers. About half were operating

men, engaged in discussing practical matters pertaining to their work.

The meeting was divided into three half-day technical sessions and one half-day for a visit to a new plant. The Great Lakes Steel Co. was the host, on Tuesday afternoon, conducting those in attendance through its new plant of six 150-ton open-hearth furnaces.

Great Britain Seeking Canadian Steel Orders

TORONTO, Nov. 24.—E. N. Martin has been appointed Canadian manager for the British Steel Export Association, with offices in the Sun Life Building, Montreal. Considerable propaganda and organization work has been done in the past year for the association by Julian I. Piggott. The British Steel Export Association comprises 13 individual companies, which propose to distribute in Canada large shapes and sizes in excess of 6-in. "I" beams, 7-in. channels, 60-in. plates and 7-in. angles, not at present produced in the Dominion.

As a result of the discount on Canadian funds in the United States, the London Structural Steel Co., London, Ont., a few days ago, withdrew an order for 50 tons of steel beams from the United States and placed it in Great Britain. Hugh McKay, general manager of the company, said

the order just placed in Britain marks its first importation from that country. This has been done in an experimental way, but he is convinced that material can be brought in from Great Britain more cheaply than from the United States with the discount on Canadian funds prevailing.

Foundry Equipment Orders Gain in October

Foundry Equipment Manufacturers' Association reports an increase in orders in October, bookings for that month being represented by the index figure 44.8, compared with 31.9 in September, 16.9 in August, 38.7 in July and 40.9 in June. The association derives its base 100 from the average monthly shipments of 1922, 1923 and 1924.

Railroads Ask Workers to Accept Wage Cut

The Great Northern, the Northern Pacific and the Chicago, St. Paul, Minneapolis & Omaha railroads have asked all contract employees to consider a 10 per cent voluntary wage cut. Action in this respect has previously been taken by the New York Central and Gulf, Mobile & Northern.

Pipe Lines

Continental Oil Co., Continental Oil Building, Denver, let contract to Gordon Construction Co., 1900 Thirty-first Street, for 4-in. pipe line in Greasewood Flats district, near Greeley, Colo., about 17 miles.

Arkansas-Louisiana Pipe Line Co., Carthage, Tex., will install 6-in. natural gas pipe line from Panola County gas field, near Carthage, to Waskom, Tex., where line will connect with plant of United Gas Co.

Texas Royalty Owners & Producers Pipe Line Corp'n., Houston, Tex., T. B. Hoffer, president, applied for permission to dispose of about \$4,750,000 in stock for construction of 12-in. pipe line from east Texas oilfields to Houston and vicinity, about 195 miles. Cost about \$3,800,000.

Board of Public Works, San Francisco, let contract to Yoddall Construction Co., Matson Building, at \$928,550.90, for pipe line in connection with Hetch Hetchy water project.

Texas-Empire Pipe Line Co. will build a 12-in. line from Lima Station in Seminole County, Okla., to east Texas, to connect the Seminole-Chicago line with the east Texas-Gulf line, now in operation.

Continental Construction Corp'n., Chicago, has revived its inquiry for 23,000 tons of 20-in. pipe for an extension to its line, to run from Geneseo, Ill., to Milwaukee. While the pipe may not be laid this winter, action is expected on the inquiry within the next week.

Brassert - Tidewater Development Corp'n., Chicago, subsidiary of H. A. Brassert & Co. and Tide Water Oil Co., has contracted with Atlantic Refining Co. for the installation of 12 Knowles coking ovens to coke heavy residues at Philadelphia. Construction is already under way, and the plant will be in operation on March 1, 1932.

Lead and Zinc Prices Down in Sympathy with Copper; Tin Output Reduced

NEW YORK, Nov. 24.—Influenced by an apparent impasse in negotiations of world copper producers to find a basis for limiting production, electrolytic copper began to be offered on Nov. 19 at 6.50c., delivered Connecticut Valley, by second hands and custom smelters. This has resulted in virtual withdrawal of primary producers from the market. Meanwhile, on Nov. 19, Copper Exporters, Inc., revised the export price downward 50 points to 7c. a lb., delivered usual European ports, so that, based on the usual difference between export and domestic prices, the market here would be 6.75c., delivered.

Lower copper prices have failed to stimulate buying by either domestic or foreign consumers. Prior to termination of the international conference of producers, a copper market of 5c. a lb., had been suggested as a possibility in certain quarters, provided world production is not curtailed. With such suggestions in mind and no urgent requirements, buyers are evidently unimpressed with the recent lower offers.

In certain instances copper producers are inclined to believe that the recent conference was not a complete failure and that some action may be taken after the foreign delegates have returned home and given the subject further consideration. It is stated in certain quarters that the conference was unable to agree fully because of claims by Rhodesian producers, rather than the stand taken by the leading Belgian interest.

Foreign interest in copper, even at the new export price of 7c., delivered European ports, has been limited in the past week, and the total for the month, including Nov. 23, stands at 19,678 tons, an increase of less than 2000 tons in a week. Demand for Lake copper is small, and prices were reduced Nov. 19 to a range of 6.75c. to 6.87½c., delivered.

Tin

Following a week of moderate buying activity, the domestic tin market has been decidedly quiet, affected by weakness in other metals. The price advanced to 23.10c. a lb. on Nov. 20, but receded yesterday. Today, the price was increased to 23.12½c., New York, based on a report from London that the producers in the East have decided to curtail output an additional 10 per cent, so that production will be at about 55 per cent of capacity. Meanwhile, the London price has continued to advance in an effort to adjust quotations to the declining value

of the pound sterling. Prices today are £135 15s. a ton for spot standard, £138 5s. for future standard, £138 5s. for spot Straits and £140 12s. 6d. from Singapore. Stocks of tin in United Kingdom warehouses declined 23 tons this week to a total of 30,550 tons. Shipments from the Straits to Nov. 21 have been 4013 tons.

Lead

Prices have settled in the past week from 4.05c., New York, and 3.90c., St. Louis, on Nov. 18; to 3.95c., New York, and 3.80c., St. Louis, on Nov. 19; to 3.75c., St. Louis on Nov. 20, with no change in New York, and to 3.85c., New York, and 3.65c., St. Louis, on Nov. 23. The recent reduction in prices brought out some buying, but most consumers are now well covered.

Zinc

The disappointment that followed termination of the copper conferences without an agreement has affected zinc as it did other metals. The mar-

ket declined five points to 3.20c. a lb., East St. Louis, on Nov. 19, and on Nov. 21 some offerings appeared at 3.15c., St. Louis, a price which was openly quoted on Nov. 23. Today, sellers have been offering an additional 2½-point reduction to 3.12½c., East St. Louis, but buying has not been stimulated. A fair proportion of actual December requirements has been covered and consumers are not inclined to buy more than actual needs as the time for year-end inventory approaches.

Antimony

The price of the Chinese metal shows a further decline both for prompt and future delivery. Prompt shipment antimony is quoted at 6.62½c., duty paid, New York, and future at about 6.50c., duty paid. Part of the decline is attributed to a lower silver market, but there has recently been a considerable increase in shipments from China, with holders there making an effort to move as much as possible out of the country.

The Week's Prices. Cents Per Pound for Early Delivery

	Nov. 24	Nov. 23	Nov. 21	Nov. 20	Nov. 19	Nov. 18
Lake copper, New York.....	6.87½	6.87½	6.87½	6.87½	6.87½	7.37½
Electrolytic copper, N. Y.*.....	6.25	6.25	6.25	6.25	6.25	6.50
Straits tin, spot, N. Y.....	23.12½	22.75	22.75	23.10	22.75	22.75
Zinc, East St. Louis.....	3.12½	3.15	3.20	3.20	3.20	3.25
Zinc, New York.....	3.48½	3.50	3.55	3.55	3.55	3.60
Lead, St. Louis.....	3.65	3.65	3.75	3.75	3.80	3.90
Lead, New York.....	3.85	3.85	3.95	3.95	3.95	4.05

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.

Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 35c. a lb., delivered.

Antimony, 6.62½c. a lb., New York.

From New York Warehouse

Delivered Prices, Base per Lb.	
Tin, Straits pig.....	25.75c. to 26.75c.
Tin, bar.....	27.75c. to 29.75c.
Copper, Lake.....	9.00c. to 10.00c.
Copper, electrolytic.....	8.50c. to 9.00c.
Copper, casting.....	8.25c. to 8.75c.
*Copper sheets, hot-rolled.....	16.12½c.
*High brass sheets.....	13.00c.
*Seamless brass tubes.....	16.25c.
*Seamless copper tubes.....	15.62½c.
*Brass rods.....	10.75c.
*Brazed brass tubes.....	21.75c.
Zinc, slab.....	4.75c. to 5.25c.
Zinc sheets (No. 9), casks.....	9.25c. to 9.50c.
Lead, American pig.....	4.75c. to 5.00c.
Lead, bar.....	6.50c. to 7.50c.
Lead sheets.....	8.25c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Alum., virgin, 99 per cent plus.....	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent.....	17.00c. to 18.00c.
Solder, ½ and ⅓.....	16.75c. to 17.75c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.	
Tin, Straits pig.....	27.00c.
Tin, bar.....	29.00c.
Copper, Lake.....	8.37½c.

Copper, electrolytic.....	8.37½c.
Copper, castings.....	8.00c.
Zinc, slab.....	4.75c. to 5.00c.
Lead, American pig.....	4.50c. to 4.75c.
Lead, bar.....	7.75c.
Antimony, Asiatic.....	10.00c.
Babbitt metal, medium grade.....	15.00c.
Babbitt metal, high grade.....	31.00c.
Solder, ½ and ⅓.....	19.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.25c.	6.00c.
Copper, hvy. and wire	5.00c.	5.75c.
Copper, light and bottoms	4.00c.	4.75c.
Brass, heavy.....	2.50c.	3.25c.
Brass, light.....	2.00c.	2.75c.
Hvy. machine composition.....	4.00c.	4.75c.
No. 1 yel. brass turnings.....	3.00c.	3.50c.
No. 1 red brass or compos. turnings.....	3.50c.	4.25c.
Lead, heavy.....	2.75c.	3.25c.
Zinc.....	1.25c.	1.75c.
Sheet aluminum.....	9.00c.	11.00c.
Cast aluminum.....	3.25c.	5.00c.

Prices of Finished and Semi-Finished Steel, BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c.
F.o.b. Chicago.....	1.70c.
Del'd Philadelphia.....	1.89c.
Del'd New York.....	1.93c.
F.o.b. Cleveland.....	1.65c.
F.o.b. Lackawanna.....	1.70c.
F.o.b. Birmingham.....	1.70c.
C.i.f. Pacific ports.....	2.00c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.60c.
F.o.b. Birmingham, mill lengths.....	1.75c.
F.o.b. Cleveland.....	1.50c. to 1.55c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.30c. to 1.35c.
F.o.b. Chicago Heights mill.....	1.50c. to 1.60c.
Del'd Philadelphia.....	1.49c. to 1.59c.

Iron

Common iron, f.o.b. Chicago.....	1.70c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c.
F.o.b. Chicago.....	1.70c.
F.o.b. Birmingham.....	1.70c.
Del'd Cleveland.....	1.78½c.
Del'd Philadelphia.....	1.78½c.
F.o.b. Coatesville.....	1.70c.
F.o.b. Sparrows Point.....	1.70c.

F.o.b. Lackawanna.....	1.70c.
Del'd New York.....	1.88c.
C.i.f. Pacific ports.....	1.85c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.60c.
F.o.b. Chicago.....	1.70c.
F.o.b. Birmingham.....	1.70c.
F.o.b. Lackawanna.....	1.70c.
F.o.b. Bethlehem.....	1.70c.
Del'd Cleveland.....	1.78½c.
Del'd Philadelphia.....	1.69½c.
Del'd New York.....	1.85½c.
C.i.f. Pacific ports (standard).....	2.05c.
C.i.f. Pacific ports (wide flange).....	2.15c.

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.	Alloy Differential per 100 Lb.
S.A.E. Series Numbers	
2000 (1½% Nickel).....	\$0.25
2100 (1½% Nickel).....	0.55
2300 (3½% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70

4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (1.00 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold-Finished Bars

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	*2.45c. to 3.40c.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh.....	1.70c.
No. 10, f.o.b. Chicago mills.....	1.80c.
No. 10, del'd Philadelphia.....	1.99c.
No. 10, f.o.b. Birmingham.....	1.85c.
No. 10, c.i.f. Pacific Coast ports.....	2.33c.

Hot-Rolled and Annealed

No. 10, Pittsburgh.....	1.85c.
No. 10, Chicago mills.....	1.95c.
No. 10, Birmingham.....	2.00c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh.....	2.40c.
No. 24, f.o.b. Chicago mills.....	2.50c.
No. 24, del'd Philadelphia.....	2.69c.
No. 24, f.o.b. Birmingham.....	2.55c.
No. 24, c.i.f. Pacific Coast ports.....	2.88c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh.....	2.35c.
No. 10 gage, f.o.b. Chicago mills.....	2.45c.
No. 10 gage, del'd Philadelphia.....	2.64c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh.....	2.95c.
No. 20 gage, f.o.b. Chicago mills.....	3.05c.
No. 20 gage, del'd Philadelphia.....	3.24c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	3.10c.
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Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh.....	2.75c.
No. 20, f.o.b. Pittsburgh.....	3.35c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh.....	2.90c.
No. 24, f.o.b. Chicago mills.....	3.00c.
No. 24, del'd Philadelphia.....	3.19c.
No. 24, f.o.b. Birmingham.....	3.05c.
No. 24, c.i.f. Pacific Coast ports.....	3.38c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh.....	3.15c.
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Vitreous Enamel Stock

No. 10, f.o.b. Pittsburgh.....	2.75c.
No. 20, f.o.b. Pittsburgh.....	3.25c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.65c.
No. 28, Chicago mills.....	2.75c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills.....	\$4.75
Standard cokes, f.o.b. Gary.....	4.85

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$9.50.....	25-lb. coating I.C. \$14.10
15-lb. coating I.C. 12.00.....	30-lb. coating I.C. 14.90
20-lb. coating I.C. 13.00.....	40-lb. coating I.C. 16.70

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh.....	1.60c.
Wider than 6 in., P'gh.....	1.50c.
6 in. and narrower, Chicago.....	1.70c.
Wider than 6 in., Chicago.....	1.60c.
Cooperage stock, P'gh.....	1.75c. to 1.85c.
Cooperage stock, Chicago.....	1.85c. to 1.95c.

Cold-Rolled Strips

F.o.b. P'gh.....	2.05c.
F.o.b. Cleveland.....	2.05c.
F.o.b. del'd Chicago.....	2.35c.
F.o.b. Worcester.....	2.20c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.10c.

*According to size.

STEEL PIPE AND TUBING

plementary discounts of 5 and 2½%, and on galvanized by 1½ points with supplementary discounts of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2½ in. 38	1½ in. 1
2½ in.—2¾ in. 46	1¾ in. 8
3 in. 52	2 in.—2¼ in. 13
3½ in.—3¾ in. 54	2½ in.—2¾ in. 16
4 in. 57	3 in.—3¼ in. 17
4½ in. to 6 in. 46	3½ in. to 3¾ in. 18
	4 in. 20
	4½ in. 21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:
Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in. 61	3 in. 46
1¼ to 1½ in. 53	3½ to 3¾ in. 48
1¾ in. 37	4 in. 51
2 to 2½ in. 32	4½, 5 and 6 in. 40
2½ to 3 in. 40	

Hot Rolled

2 and 2½ in. 38	3½ to 3¾ in. 54
2½ and 2¾ in. 46	4 in. 57
3 in. 52	4½, 5 and 6 in. 46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads).....	55
Carbon, 0.30% to 0.40% base.....	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Steel		Butt Weld		Iron	
Inches	Black	Galv.	Inches	Black	Galv.
1½.....	47	21½	1½ and ¾.....	11	36
1¾ to 2.....	53	27½	1¾.....	23	5
2.....	58	41½	2.....	28	11
2½.....	62	50½	1 and 1¼.....	31	15
3.....	64	52½	1½ and 2.....	35	18
2.....	57	45½	Lap Weld		
2½ to 6.....	61	49½	2.....	23	9
7 and 8.....	58	45½	2½ to 3½.....	28	13
9 and 10.....	56	43½	4 to 6.....	30	17
11 and 12.....	55	42½	7 and 8.....	29	16
			9 to 12.....	26	11
Butt Weld, extra strong, plain ends					
1½.....	43	26½	1½ and ¾.....	13	48
1¾ to 2.....	49	32½	1¾.....	23	7
2.....	55	44½	2.....	28	12
2½.....	60	49½	1 to 2.....	34	18
1 to 1½.....	62	51½	Lap Weld, extra strong, plain ends		
2 to 3.....	63	52½	2.....	29	13
2.....	55	44½	2½ to 4.....	34	20
2½ to 4.....	59	48½	4½ to 6.....	33	19
4½ to 6.....	58	47½	7 and 8.....	31	17
7 to 8.....	54	41½	9 to 12.....	21	8
9 and 10.....	47	34½			
11 and 12.....	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with sup-

Bolts, Nuts, Coke, Coal, Fuel Oil, Cast Iron Pipe

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade
Bright wire 2.20c.
Spring wire 3.20c.

To Jobbing Trade

Base per Keg
Standard wire nails \$1.90
Smooth coated nails 1.90
Galvanized nails 3.90

Base per Lb.
Smooth annealed wire 2.35c.
Smooth galvanized wire 2.80c.
Polished staples 2.35c.

Galvanized staples 2.60c.
Barbed wire, galvanized 2.55c.
Woven wire fence, Nos. 9 and 11 gage, per net ton \$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton 60.00

To Retail Trade

Base per Keg
Standard wire nails \$2.00
Cement coated nails 2.00
Galvanized nails 4.00

Base per Lb.
Smooth annealed wire 2.45c.

Smooth galvanized wire 2.90c.
Polished staples 2.45c.
Galvanized staples 2.70c.
Barbed wire, galvanized 2.65c.
Woven wire fence, Nos. 9 and 11 gage, per net ton \$60.00
Woven wire fence, 12½ gage and lighter, per net ton 65.00

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

RAILS AND TRACK SUPPLIES

Rails

Per Gross Ton
Standard, f.o.b. mill \$43.00
Light (from billets), f.o.b. mill 34.00
Light (from rail steel), f.o.b. mill 32.00

Track Equipment

Base per 100 Lb.
Spikes, ½-in. and larger \$2.70
Spikes, ¾ in. and larger 2.70
Spikes, boat and barge 2.90

Tie plate, steel 1.85
Angle bars 2.75
Track bolts, to steam railroads \$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count 73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List
Machine bolts 73, 10 and 10
Carriage bolts 73, 10 and 10
Lag bolts 73, 10 and 10
Flange bolts, Nos. 1, 2, 3 and 7 heads, 73, 10 and 10
Hot-pressed nuts, blank or tapped, square, 73, 10 and 10
Hot-pressed nuts, blank or tapped, hexagons, 73, 10 and 10
Cap and t. square or hex. nuts, blank or tapped 73, 10 and 10
Washers* 7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
*Bolts with rolled thread up to and including ½ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List
Semi-finished hexagons nuts 73, 10 and 10
Semi-finished hexagons castellated nuts, S.A.E. 73, 10 and 10
Stove bolts in packages, P'gh. 80, 25 and 10
Stove bolts in packages, Ch'go. 80, 25 and 10
Stove bolts in pkgs., Cleveland. 80, 25 and 10
Stove bolts in bulk, P'gh. 80, 25, 10 and 2½
Stove bolts in bulk, Ch'go. 80, 25, 10 and 2½
Stove bolts, in bulk, Cleveland. 80, 25, 10 and 2½
Tire bolts 60, 10 and 10

Discounts of 73, 10 and 10 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)
Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland \$2.25
F.o.b. Chicago 2.35

Small Rivets

(½-in. and smaller)

Per Cent Off List
F.o.b. Pittsburgh 70, 10 and 5
F.o.b. Cleveland 70, 10 and 5
F.o.b. Chicago 70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List
Milled cap screws 80, 10, 10 and 5
Milled standard set screws, case hardened, 80 and 5
Milled headless set screws, cut thread, 75 and 10
Upset hex. head cap screws, U.S.S.S. thread, 85 and 10
Upset hex. cap screws, S.A.E. thread, 85 and 10
Upset set screws 80, 10 and 5
Milled studs 70

Billets and Blooms

Per Gross Ton
Re-rolling, 4-in. and under 10-in., Pittsburgh \$29.00
Re-rolling, 4-in. and under 10-in., Youngstown 29.00
Re-rolling, 4-in. and under 10-in., Cleveland 29.00
Re-rolling, 4-in. and under 10-in., Chicago 31.00
Forging quality, Pittsburgh 35.00

SEMI-FINISHED STEEL

Sheet Bars

(Open-Hearth or Bessemer)

Per Gross Ton
Pittsburgh \$29.00
Youngstown 29.00
Cleveland 29.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

Per Gross Ton
Pittsburgh \$29.00
Youngstown 29.00
Cleveland 29.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton
Furnace, f.o.b. Connellsville prompt \$2.40
Foundry, f.o.b. Connellsville prompt 3.25 to 4.50
Foundry, by-product, Ch'go ovens 7.50
Foundry, by-product, New England, del'd 10.50
Foundry, by-product, Newark or Jersey City, delivered 8.70 to 9.10

Foundry, by-product, Phila. \$9.00
Foundry, Birmingham 5.00
Foundry, by-product, St. Louis, f.o.b. ovens 8.00
Foundry, by-product, del'd St. Louis 9.00

Coal

Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines \$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa. 1.50 to 1.60

Gas coal, ¾-in., f.o.b. Pa. mines \$1.70 to \$1.80
Mine run gas coal, f.o.b. Pa. mines 1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines 0.35 to 0.45
Gas slack, f.o.b. W. Pa. mines 0.55 to 0.75

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate 3.50c.
No. 4 industrial 3.00c.

FLUXES AND REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works
High-Heat Intermediate
Duty Brick Heavy Duty Brick
Pennsylvania \$40.00 \$32.00 to \$35.00
Maryland 40.00 32.00 to 35.00
New Jersey \$44.00 to 59.00
Ohio 40.00 32.00 to 35.00
Kentucky 40.00 32.00 to 35.00
Missouri 37.00 32.00 to 35.00
Illinois 40.00 32.00 to 35.00
Ground fire clay, per ton 6.50

CAST IRON PIPE

Per Net Ton
6-in. and larger, del'd Chicago \$40.00 to \$44.00
4-in., del'd Chicago 43.00 to 47.00

6-in. and larger, del'd New York \$32.90
4-in., del'd New York 35.90
6-in. and larger, Birmingham \$32.00 to 33.00

4-in., Birmingham \$35.00 to \$36.00
Class "A" and gas pipe, \$3 extra.

▲ ▲ ▲ Pig Iron Prices for All Districts ▲ ▲ ▲

▶ VALLEY ◀

Per gross ton, f.o.b. Valley furnace:

Basic	\$15.00
Bessemer	16.50
Gray forge	16.00
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.50
Low phos., copper free	\$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

▶ PITTSBURGH ◀

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	\$15.50 to \$16.00
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Bessemer	17.00

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

▶ CHICAGO ◀

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	\$17.00
N'th'n No. 1 fdy.	17.50
Malleable, not over 2.25 sil.	17.00
High phosphorus	17.00
Lake Super. charcoal, sil.	
1.50	25.04
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, cop-	
per free	\$28.50 to 29.20
Silvery, sil. 8 per cent.	24.79
Bess. ferrosilicon, 14-15%	31.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including an average switching charge of 61c. per gross ton.

▶ ST. LOUIS ◀

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25 f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	19.16
Southern No. 2 fdy., deliv'd	15.42
Northern malleable, deliv'd	19.16
Northern basic, deliv'd	19.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

▶ NEW YORK ◀

Per gross ton, delivered New York district:

*Buffalo No. 2, del'd east.	
N. J.	\$17.78 to \$18.28
East. Pa. No. 2 fdy.	16.89 to 17.39
East. Pa. No. 2X fdy.	17.89 to 18.39

Freight rates: \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

▶ BUFFALO ◀

Per gross ton, f.o.b. furnace:

No. 2 fdy.	\$17.00
No. 2X fdy.	17.50
No. 1 fdy.	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	25.28

▶ NEW ENGLAND ◀

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	\$19.91
*Buffalo, sil. 2.25 to 2.75	19.91
*Ala., sil. 1.75 to 2.25	\$20.11 to 20.61
*Ala., sil. 2.25 to 2.75	20.61 to 21.11
†Ala., sil. 1.75 to 2.25	16.75
†Ala., sil. 2.25 to 2.75	17.25

Freight rates: \$4.91 all rail and \$4.28 rail and water from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

▶ CINCINNATI ◀

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	\$14.69
Ala. fdy., sil. 2.25 to 2.75	15.19
Tenn. fdy., sil. 1.75 to 2.25	14.69
N'th'n No. 2 foundry	17.90
S'th'n Ohio silvery, 8 per cent.	23.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

▶ PHILADELPHIA ◀

Per gross ton at Philadelphia:

East. Pa. No. 2	\$15.51 to \$16.01
East. Pa. No. 2X	16.01 to 16.51
East. Pa. No. 1X	16.51 to 17.01
Basic (del'd east. Pa.)	16.25
Malleable	18.50 to 19.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain	22.04
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

▶ CLEVELAND ◀

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	\$17.00
S'th'n fdy., sil. 1.75 to 2.25	17.01
Malleable (local delivery)	17.00
Ohio silvery, 8 per cent.	23.00
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

▶ BIRMINGHAM ◀

Per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$12.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50
Basic	12.00

▶ CANADA ◀

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.50
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

▲ ▲ ▲ Prices of Ores and Ferroalloys ▲ ▲ ▲

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 9c.
Iron, low phos., Swedish, aver. 68% iron	10.00c.
Iron, basic or foundry, Swedish, average 65% iron	9.00c.
Iron, basic and foundry, Russian, average 63% iron	9.00c.
Manganese, Caucasian, washed 52% .25c. to 26c.	
Manganese, African, Indian, 50-52% .23c. to 24c.	
Manganese, Brazilian, 46 to 48% .22c. to 23c.	
Tungsten, 60% concentrates	\$12.00 to \$12.50

	Per Gross Ton
Chrome, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$20.00
Chrome, 48% Cr ₂ O ₃ , c.i.f. Atlantic seaboard	22.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	*\$80.00 to \$85.00
Foreign, 80%, Atlantic or gulf port, duty paid	*80.00 to 85.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	\$28.00 to \$30.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	\$83.50
75%	130.00
	Per Gross Ton Furnace
10%	\$35.00
11%	37.00
	Per Gross Ton
12%	\$39.00
14 to 16%	31.00

Bessemer Ferrosilicon

	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
10%	\$22.00
11%	22.50
12%	23.50
13%	\$24.50
14%	26.50
15%	28.50

Silvery Iron

	F.o.b. Jackson County, Ohio, Furnace
	Per Gross Ton
6%	\$19.00
7%	19.50
8%	20.00
9%	20.50
10%	21.00
	Per Gross Ton
11%	\$21.50
12%	22.50
13%	23.50
14%	25.50
15%	27.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	\$1.08
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	24.50c. to 26.00c.
Ferrochromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovanadium, per lb. Va. furnace	\$3.15 to \$3.65
Ferrocobalt, 15 to 18%, per net ton, f.o.b. furnace, in carloads	160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18% Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. Mo., del.	1.00
Calcium molybdate, per lb. Mo., del.	85c.
Ferrophosphorus, electric, 24%, f.o.b. An-niston, Ala., per gross ton	\$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	\$5 a ton higher

Old Material Quotations

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	9.00 to 9.50
No. 2 railroad wrought	10.00 to 10.50
Scrap rails	10.00 to 10.50
Drop for flashings	12.00 to 12.50
Steel bar crops, ordinary	11.00 to 11.50
Compressed sheet steel	9.00 to 9.50
Drop for flashings	9.00 to 9.50
Machine shop turnings	6.75 to 7.25
Short shoveling turnings	6.75 to 7.25
Steel mixed borings and	6.75 to 7.25
turnings	6.75 to 7.25
Cast iron borings	6.75 to 7.25
Cast iron carwheels	10.50 to 11.00
Heavy breakable cast	8.00 to 8.50
No. 1 cast	9.50 to 10.50
Bar, knuckles and coup-	10.50 to 11.50
plers	10.50 to 11.50
Coil and leaf springs	10.50 to 11.50
Steel wheels	10.50 to 11.50
Low phos. billet crops	13.00 to 13.50
Low phos. sheet bar crops	12.50 to 13.00
Low phos. plate scrap	11.00 to 11.50
Low phos. punchings	12.50 to 13.00
Steel car axles	15.50 to 16.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton

Heavy melting steel	\$7.75 to \$8.25
Shoveling steel	7.75 to 8.25
Frogs, switches and guards	7.75 to 8.25
Factory hyd. comp. sheets	6.00 to 6.50
Drop for flashings	5.00 to 5.50
No. 1 busheling	5.50 to 6.00
Roller carwheels	8.25 to 9.25
Railroad tires	9.00 to 9.50
Railroad leaf springs	9.50 to 10.00
Axle turnings	6.00 to 6.50
Steel couplers and knuckles	8.50 to 9.00
Coil springs	9.50 to 10.00
Axle turnings	6.00 to 6.50
Low phos. punchings	10.00 to 10.50
Low phos. plates, 12 in.	9.00 to 9.50
and under	4.00 to 4.50
Cast iron borings	4.00 to 4.50
Short shoveling turnings	4.00 to 4.50
Machine shop turnings	4.00 to 4.50
Rerolling rails	10.50 to 11.00
Steel rails, less than 3 ft.	9.25 to 9.75
Steel rails, less than 2 ft.	10.00 to 10.50
Angle bars, steel	8.25 to 8.75
Cast iron carwheels	8.50 to 9.00
Railroad malleable	7.50 to 8.00
Agricultural malleable	7.00 to 7.50
*Relaying rails, 56 to 60 lb.	19.00 to 21.00
*Relay. rails, 65 lb. and up	22.00 to 27.00

Per Net Ton

Iron angle and splice bars	7.00 to 7.50
Iron arch bars, transoms	7.50 to 8.00
Iron car axles	13.50 to 14.50
Steel car axles	10.50 to 11.00
No. 1 railroad wrought	6.50 to 7.00
No. 2 railroad wrought	6.75 to 7.25
No. 1 busheling	5.00 to 5.50
No. 2 busheling	4.00 to 4.50
Locomotive tires, smooth	10.50 to 11.50
Pipes and flues	3.50 to 4.00
No. 1 machinery cast	8.50 to 9.00
No. 1 railroad cast	7.00 to 7.50
No. 1 agricultural cast	7.00 to 7.50
Stove plate	6.25 to 6.75
Grate bars	5.50 to 6.00
Brake shoes	5.75 to 6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	\$7.50 to \$8.50
No. 2 heavy melting steel	6.50 to 7.00
No. 1 railroad wrought	9.50 to 10.00
Bundled sheets	6.00 to 6.50
Hydraulic compressed, new	7.00 to 7.50
Hydraulic compressed, old	6.00 to 6.50
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	7.00 to 7.50
Cast borings (nom.)	3.50 to 4.00
Heavy breakable cast	9.50 to 10.00
Stove plate (steel works)	7.50 to 8.00
No. 1 low phos. hvy.	11.00 to 12.00
Couplers and knuckles	11.00 to 11.50
Roller steel wheels	10.00 to 10.50
No. 1 blast furnace	3.50 to 4.00
Spec. iron and steel pipe	10.50 to 11.00
Shafting	15.00 to 15.50
Steel axles	15.00 to 15.50
No. 1 forge fire	7.50 to 8.00
Cast iron carwheels	11.50 to 12.00
No. 1 cast	10.50 to 11.00
Cast borings (chem.)	11.50 to 12.00
Steel rails for rolling	10.50 to 11.00

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	\$7.50 to \$8.00
No. 2 heavy melting steel	6.75 to 7.25
Compressed sheet steel	7.00 to 7.25
Light bundled sheet	6.00 to 6.50
stampings	6.00 to 6.50
Drop for flashings	6.00 to 6.25
Machine-shop turnings	4.75 to 5.25
Short shoveling turnings	5.75 to 6.25
No. 1 busheling	6.50 to 6.75
Steel axle turnings	7.50 to 8.00
Low phos. billet crops	14.00 to 14.50
Cast iron borings	5.25 to 5.75
Mixed borings and short	5.25 to 5.75
turnings	5.25 to 5.75
No. 2 busheling	5.25 to 5.75
No. 1 cast	9.00 to 9.50
Railroad grate bars	6.00 to 6.50
Stove plate	6.00 to 6.50
Rails under 3 ft.	15.00 to 15.50
Rails for rolling	13.00 to 13.50
Railroad malleable	11.00 to 11.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	\$8.50 to \$9.00
No. 2 heavy melting scrap	7.50 to 8.00
Scrap rails	9.50 to 10.00
New hyd. comp. sheets	7.00 to 7.50
Old hyd. comp. sheets	5.50 to 6.00
Drop for flashings	7.00 to 7.50
No. 1 busheling	7.25 to 7.75
Hvy. steel axle turnings	8.00 to 8.50
Machine shop turnings	4.50 to 5.00
Knuckles and couplers	10.00 to 10.50
Coil and leaf springs	10.00 to 10.50
Roller steel wheels	10.00 to 10.50
Low phos. billet crops	12.50 to 13.00
Short shov. steel turnings	7.00 to 7.50
Short mixed borings and	6.00 to 6.50
turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	4.50 to 5.00
Steel car axles	12.00 to 12.50
Iron axles	16.00 to 16.50
No. 1 machinery cast	10.00 to 10.50
Stove plate	8.25 to 8.50
Steel rails, 3 ft. and under	12.00 to 12.50
Cast iron carwheels	10.50 to 11.00
Industrial malleable	10.00 to 10.50
Railroad malleable	10.00 to 10.50
Chemical borings	9.00 to 9.50

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	\$8.50 to \$9.00
Scrap steel rails	8.00 to 8.50
Short shoveling turnings	4.00 to 5.00
Stove plate	6.00 to 6.50
Steel axles	14.00 to 14.50
Iron axles	14.00 to 14.50
No. 1 railroad wrought	6.50 to 7.00
Rails for rolling	10.00 to 10.50
No. 1 cast	9.00 to 9.50
Tramcar wheels	10.00 to 10.25
Cast iron borings, chem.	12.00 to 12.50

ST. LOUIS

Dealers' buying prices per gross ton:

Selected heavy steel	\$7.25 to \$7.75
No. 1 heavy melting	6.75 to 7.25
No. 2 heavy melting	6.50 to 7.00
No. 1 locomotive tires	8.00 to 8.50
Misc. stand-sec. rails	8.25 to 8.75
Railroad springs	8.50 to 9.00
Bundled sheets	4.25 to 4.75
No. 2 railroad wrought	6.75 to 7.25
No. 1 busheling	6.00 to 6.50
Cast iron borings and	4.75 to 5.25
shoveling turnings	7.00 to 7.50
Iron rails	9.50 to 10.00
Rails for rolling	3.00 to 3.50
Machine shop turnings	5.50 to 6.00
Heavy turnings	10.50 to 11.00
Steel car axles	14.00 to 14.50
Iron car axles	15.50 to 16.00
Wrot. iron bars and trans.	5.00 to 5.50
No. 1 railroad wrought	10.00 to 10.50
Steel rails, less than 3 ft.	7.00 to 7.50
Steel angle bars	6.50 to 7.00
Cast iron carwheels	8.00 to 8.50
No. 1 machinery cast	5.50 to 6.00
Railroad malleable	6.25 to 6.75
No. 1 railroad cast	6.00 to 6.50
Stove plate	16.00 to 16.50
Relay. rails, 60 lb. and	20.00 to 21.00
under	5.00 to 5.50
Relay. rails, 70 lb. and	
over	
Agricult. malleable	

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	\$4.50 to \$5.50
Heavy melting steel (yard)	2.75 to 3.00
No. 1 hvy. breakable cast	5.50 to 6.00
Stove plate (steel works)	2.00 to 2.50
Machine shop turnings	2.00 to 2.50
Short shoveling turnings	2.50 to 3.00
Cast borings	2.50 to 3.00
No. 1 blast furnace	11.00 to 11.50
Steel car axles	14.00 to 14.50
Iron car axles (nom.)	5.50 to 6.00
Spec. iron and steel pipe	3.25 to 3.75
Forge fire	5.00 to 5.25
No. 1 railroad wrought	4.00 to 4.25
No. 1 yard wrought, long	6.00 to 6.25
Rails for rolling	4.75 to 5.00
Stove plate (foundry)	6.00 to 6.50
Malleable cast (railroad)	8.00 to 8.50
Cast borings (chemical)	

Per gross ton, delivered local foundries:

No. 1 machinery cast	\$8.50 to \$9.00
No. 1 hvy. cast (cupola size)	6.50 to 7.00
No. 2 cast	5.50 to 6.00

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	\$3.80 to \$4.60
Scrap T rails	4.10 to 4.60
Scrap girder rails	3.10 to 3.60
No. 1 railroad wrought	4.50 to 5.00
Machine shop turnings	1.25 to 2.10
Cast iron borings	1.50 to 1.75
Bundled skeleton, long	3.00 to 3.25
Forge flashings	3.00 to 3.50
Blast furnace scrap	1.25 to 1.30
Forged scrap	2.00 to 2.50
Shafting	10.00 to 10.50
Steel car axles	11.00 to 12.00
Wrought pipe	4.00 to 4.25
Rails for rolling	6.00 to 6.50
Cast iron borings, chemical	7.00 to 7.25
No. 2 cast	4.85 to 5.00

Per gross ton delivered consumers' yards:

Textile cast	8.75 to 9.25
No. 1 machinery cast	8.75 to 9.25
Stove plate	5.00 to 5.25
Railroad malleable	10.50 to 11.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	\$6.75 to \$7.25
Scrap rails for melting	8.50 to 9.00
Loose sheet clippings	3.50 to 4.00
Bundled sheets	5.50 to 6.00
Cast iron borings	3.25 to 3.75
Machine shop turnings	4.00 to 4.50
No. 1 busheling	5.00 to 5.50
No. 2 busheling	3.25 to 3.75
Rails for rolling	9.00 to 9.50
No. 1 locomotive tires	8.50 to 9.00
No. 2 railroad wrought	6.75 to 7.25
Short rails	11.75 to 12.25
Cast iron carwheels	8.25 to 8.75
No. 1 machinery cast	10.00 to 10.50
No. 1 railroad cast	8.75 to 9.25
Burnt cast	4.25 to 4.75
Stove plate	4.25 to 4.75
Brake shoes	4.25 to 4.75
Agricultural malleable	8.00 to 8.50
Railroad malleable	9.00 to 9.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting	\$6.00 to \$6.50
Borings and short turnings	4.50 to 5.00
Long turnings	4.00 to 4.50
No. 1 machinery cast	8.50 to 9.00
Automotive cast	11.00 to 11.50
Hydraulic comp. sheets	5.75 to 6.25
Stove plate	5.00 to 5.50
New No. 1 busheling	5.00 to 5.50
Old No. 2 busheling	3.25 to 3.75
Sheet clippings	3.50 to 4.00
Flashings	5.25 to 5.75

CANADA

Dealers buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	\$7.00	\$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast		10.00
Stove plate		8.00
Standard carwheels		8.50
Malleable		8.00

▲ ▲ ▲ Warehouse Prices for Iron and Steel Products ▲ ▲ ▲

► CHICAGO ◀

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.75c.
Reinforcing bars, billet steel.....	1.50c. to 1.80c.
Rail steel reinforcement—	
For buildings.....	1.30c. to 1.40c.
Highway slabs.....	1.40c.
For bridges and culverts.....	1.50c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.10c.
Flats and squares.....	3.60c.
Bands, $\frac{1}{8}$ in. (in Nos. 10 and 12 gages).....	2.95c.
Hoops (No. 14 gage and lighter).....	3.50c.
Hot-rolled annealed sheets (No. 24).....	3.55c.
Galv. sheets (No. 24).....	4.10c.
Hot-rolled sheets (No. 10).....	3.20c.
Spikes ($\frac{1}{2}$ in. and larger).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
	Per Cent Off List
Machine bolts.....	73
Carriage bolts.....	73
Coach and lag screws.....	73
Hot-pressed nuts, sq., tap. or blank.....	73
Hot-pressed nuts, hex., tap. or blank.....	73
No. 8 black ann'l'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c't'd nails, base per keg.....	2.30

► CLEVELAND ◀

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.75c.
Reinforc. steel bars.....	1.75c. to 1.95c.
Cold-fin. rounds and hex.....	3.10c.
Cold-fin. flats and sq.....	3.60c.
Hoops and bands, No. 12 to $\frac{1}{4}$ in., inclusive.....	3.00c.
Hoops and bands, No. 13 and lighter.....	3.55c.
Cold-finished strip.....	5.55c.
Hot-rolled annealed sheets (No. 24).....	3.60c.
Galvanized sheets (No. 24).....	4.00c.
Hot-rolled sheets (No. 10).....	3.00c.
No. 9 ann'l'd wire, per 100 lb.....	\$2.25
No. 9 galv. wire, per 100 lb.....	2.70
Com. wire nails, base per keg.....	2.25

*Net base, including boxing and cutting to length.

► CINCINNATI ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
New billet reinforce. bars.....	3.00c.
Rail steel reinforce. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.20c.
Squares.....	3.50c.
Cold-fin. rounds and hex.....	4.00c.
Hot-rolled annealed sheets (No. 24).....	3.75c.
Galv. sheets (No. 24).....	4.25c.
Hot-rolled sheets (No. 10).....	3.30c.
Structural rivets.....	4.20c.
Small rivets.....	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (10 to 49 kegs).....	2.45
Larger quantities.....	2.50
Cement c't'd nails, base 100-lb. keg.....	2.95
Chain, per 100 lb.....	10.25
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.....	\$17.50
4-in.....	36.00
Lap-welded steel boiler tubes, 2-in.....	16.50
4-in.....	34.50

► BUFFALO ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.00c.
Reinforcing bars.....	2.65c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.25c.
Hot-rolled annealed sheets (No. 24).....	3.70c.
Galv. sheets (No. 24).....	4.10c.
Bands.....	3.35c.
Hoops.....	3.90c.
Hot-rolled sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.45
Black wire, base per 100 lb.....	3.20

► NEW YORK ◀

	Base per Lb.
Plates and struc. shapes.....	2.70c. to 3.10c.
Soft steel bars, small shapes.....	2.70c. to 3.10c.
Iron bars.....	3.21c.
Iron bars, Swed. charcoal.....	7.00c. to 7.55c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard.....	4.95c.
Hoops.....	3.75c.
Bands.....	3.40c.
Hot-rolled sheets (No. 10).....	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*).....	3.60c.
Galvanized sheets (No. 24*).....	4.00c.
Long terme sheets (No. 24).....	5.00c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, $\frac{1}{2}$ x $\frac{1}{2}$ in. and larger.....	3.40c.
Smooth finish, 1 to 2 $\frac{1}{2}$ x $\frac{1}{4}$ in. and larger.....	3.75c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
$\frac{3}{4}$ x 6 in. and smaller.....	.65 to .65 and 10
1 x 30 in. and smaller.....	.65 to .65 and 10

	Per Cent Off List
Carriage bolts, cut thread:	
$\frac{1}{2}$ x 6 in. and smaller.....	.65 to .65 and 10
$\frac{3}{4}$ x 20 in. and smaller.....	.65 to .65 and 10

	Per 100 Ft.
Boiler Tubes:	
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00

► ST. LOUIS ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
Cold-fin. rounds, shafting, screw stock.....	3.35c.
Hot-rolled annealed sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Hot-rolled sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	3.85c.
Galv. corrug. sheets.....	4.40c.
Structural rivets.....	4.00c.
Boiler rivets.....	4.00c.

	Per Cent Off List
Tank rivets, $\frac{1}{2}$ -in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	73
Carriage bolts.....	73
Lag screws.....	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63

► PACIFIC COAST ◀

(Less than 5000 Lb.)

	Base per Lb.	San Francisco	Los Angeles	Seattle
Plates and struc. shapes, $\frac{1}{4}$ -in. and heavier.....	2.80c.	3.00c.	2.50c.	2.50c.
Soft steel bars.....	2.80c.	3.00c.	2.50c.	2.50c.
Reinforcing bars.....	2.80c.	2.80c.	3.00c.	3.00c.
Hot-rolled annealed sheets (No. 24).....	3.90c.	4.00c.	4.00c.	4.00c.
Hot-rolled sheets (No. 10).....	3.40c.	3.50c.	3.50c.	3.50c.
Galv. sheets (No. 24).....	4.40c.	4.20c.	4.50c.	4.50c.
Struc. rivets, $\frac{1}{2}$ in. and larger, less than 1000 lb.....	5.00c.	5.00c.	5.50c.	5.50c.
Special nails: common 4 to 60d; smooth box 4 to 20d; finish 6 and 8 d; base per keg.....	\$2.55	\$2.45	\$2.40	\$2.40
Other wire nails, base per keg.....	2.80	2.70	2.65	2.65
Cement c't'd nails, 100-lb. keg.....	2.65	2.70	2.65	2.65

► PITTSBURGH ◀

	*Base per Lb.
Plates.....	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes.....	2.60c.
Reinforcing steel bars.....	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.10c.
Squares and flats.....	3.60c.
Bands.....	2.95c.
Hoops.....	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles.....	3.05c.
Galv. sheets (No. 24), 25 or more bundles.....	3.65c.
Hot-rolled sheets (No. 10).....	3.15c. to 3.20c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	3.74c.
Spikes, large.....	2.50c.
Small.....	2.75c. to 2.90c.
Boat.....	3.00c.
Track bolts, all sizes, per 100 count, 73 and 10 per cent off list.....	
Machine bolts, 100 count, 73 and 10 per cent off list.....	
Carriage bolts, 100 count, 73 and 10 per cent off list.....	
Nuts, all styles, 100 count, 73 and 10 per cent off list.....	
Large rivets, base per 100 lb.....	\$3.00
Wire, black, soft ann'l'd, base per 100 lb.....	2.30
Wire, galv. soft, base per 100 lb.....	2.75
Common wire nails, per keg.....	\$2.05 to 2.15
Cement coated nails, per keg.....	2.05 to 2.15

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

► PHILADELPHIA ◀

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier.....	2.50c.
Structural shapes.....	2.50c.
Soft steel bars, small shapes, iron bars (except bands).....	2.60c.
Reinforc. steel bars, sq., twisted and deform.....	2.30c.
Cold-fin. steel, rounds and hex.....	3.40c.
Cold-fin. steel, sq. and flats.....	3.90c.
Steel hoops.....	3.15c.
Steel bands, No. 12 to $\frac{1}{4}$ -in., inclu. Spring steel.....	5.00c.
Hot-rolled box annealed sheets (No. 24).....	3.55c.
Galvanized sheets (No. 24).....	4.00c.
Hot rolled blue annealed sheets (No. 10).....	3.05c.
Diam. pat. floor plates, $\frac{1}{4}$ -in.....	5.20c.
Swedish iron bars.....	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

► BOSTON ◀

	Base per Lb.
Plates.....	*3.35c.
Structural shapes—	
Angles and beams.....	*3.35c.
Tees.....	*3.35c.
Zees.....	*3.35c.
Soft steel bars, small shapes.....	*3.25c.
Reinforcing bars.....	3.10c. to 3.25c.
Iron bars—	
Refined.....	3.25c.
Best refined.....	4.60c.
Norway rounds.....	6.40c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth.....	5.00c.
Crucible.....	12.00c.
Tire steel.....	4.50c. to 4.75c.
Bands.....	*3.75c. to 4.25c.
Hoop steel.....	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.50c.
Squares and flats.....	4.00c. to 6.00c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.80c.
	Per Cent Off List
Machine bolts.....	70
Carriage bolts.....	70
Lag screws.....	70
Hot-pressed nuts.....	40 and 10
Cold-punched nuts.....	40 and 10
Stove bolts.....	70 and 10

*Base price (250 to 999 lb.); less than 250 lb. add 50c. per 100 lb.; 1000 to 7999 lb. deduct 15c.; 8000 to 14,999 lb. deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

Fabricated Structural Steel

STRUCTURAL steel awards of 14,500 tons compare with 17,000 tons a week ago. Included are 3000 tons for a New York Central Railroad grade crossing elimination in Buffalo, 4900 tons for the United States Supreme Court building in Washington and 2000 tons for a railroad station and office building in St. Louis.

New fabricated steel projects of 13,000 tons compare with 32,000 tons a week ago and 5500 tons two weeks ago. Included this week are 2300 tons for a section of subway in Newark, N. J., and 1500 tons for a post office superstructure in Atlanta, Ga. Awards follow:

NORTH ATLANTIC STATES

Framingham-Natick, Mass., 450 tons, three bridges, to American Bridge Co.
Waterbury, Conn., 400 tons, post office, to Bethlehem Fabricators, Inc.
Swanton, Vt., 370 tons, bridge for St. Johnsbury & Lake Champlain Railroad, to McClintic-Marshall Corpn.
State of Massachusetts, 400 tons, two highway bridges, to American Bridge Co.
New York, 800 tons, Y. M. C. A. for colored people, to American Bridge Co.
New York, 900 tons, school No. 85, to Harris Structural Steel Co.
New York, 580 tons, track stringers for Manhattan Bridge to McClintic-Marshall Corpn.
New York, 200 tons, private school in Bronx, to Ingalls Iron Works.
Brooklyn, 850 tons, bridge for Long Island Railroad, to McClintic-Marshall Corpn.
Brooklyn, 400 tons, incinerator plant, to American Bridge Co.
Floral Park, N. Y., 250 tons, Long Island Railroad bridge, to American Bridge Co.
Whitehall, N. Y., 700 tons, grade crossing elimination for Delaware & Hudson Railroad, to McClintic-Marshall Corpn.
Whitehall, N. Y., 1100 tons, sheet steel piling, Delaware & Hudson grade crossing elimination, to Bethlehem Steel Co.
Buffalo, 3000 tons, grade crossing elimination for New York Central Railroad, to McClintic-Marshall Corpn.
Washington, 4900 tons, Supreme Court Building, to McClintic-Marshall Corpn.
State of Maryland, 315 tons, Monocacy River bridge, to American Bridge Co.

THE SOUTH

State of Louisiana, 1200 tons, highway bridges, to Missouri Valley Bridge & Iron Works.

CENTRAL STATES

Cleveland, 205 tons, Parma reservoir building for city, to Fort Pitt Bridge Works Co.
Ottawa County, Ohio, 340 tons, highway bridge, to Brookville Bridge Co., Brookville, Ohio.
Iona, Mich., 225 tons, prison building, to Lake Shore Engine Works, Marquette, Mich.
Fort Wayne, Ind., 220 tons, filtration plant, to Rochester Bridge Co., Rochester, Ind.
Hoopestown, Ill., 400 tons, factory building for Sprague-Sells Corpn., to Mississippi Valley Structural Steel Co.
Aurora, Ill., 250 tons, post office, to Midland Structural Steel Co.
Woodbury, Iowa, 200 tons, overhead crossing, to Des Moines Steel Co.
St. Louis, 2000 tons, North American Building (Illinois Terminal Railway Station and office building), to Mississippi Valley Structural Steel Co.
Cleveland, 800 tons, sewage disposal plant, to American Bridge Co.
Oak Park, Ill., 300 tons, Arcade building, to American Bridge Co.
Dupage-Cook Counties, Ill., 460 tons, truss span, to Midland Steel Co.
State of Michigan, 170 tons, highway bridge, to Fort Pitt Bridge Works Co.

WESTERN STATES

Seattle, 100 tons, foundation for standpipes, to Pacific Car & Foundry Co.
Seattle, 100 tons, marine hospital, to Isaacson Iron Works.
Shelton, Wash., 300 tons, Skokomish River highway bridge, to Pacific Car & Foundry Co.
Berkeley, Cal., 1100 tons, men's gymnasium at University of California, to Judson Pacific Co.
Los Angeles County, Cal., 113 tons, Alamitos Bay bridge, to Virginia Bridge & Iron Works.

Los Angeles, 105 tons, Garfield School gymnasium, to Consolidated Steel Co.
Los Angeles, 300 tons, Safeway Stores warehouse, to McClintic-Marshall Corpn.

CANAL ZONE

Panama, 800 tons, cable way, towers and trestle for Madden dam, to Stupp Brothers Bridge & Iron Co.

NEW STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

Boston, 1200 tons, State office building.
Quincy, Mass., 300 tons, two New York, New Haven & Hartford Railroad bridges and railroad station.
Needham, Mass., 100 tons, State bridge.
New York, 600 tons, apartment house on Riverside Drive.
Brooklyn, 1200 tons, high school.
Newark, N. J., 2300 tons, section of subway.
Coatesville, Pa., 100 tons, sewage treatment plant and collecting sewers for city; bids in.

THE SOUTH

Charlottesville, Va., 500 tons, building for Charlottesville Woolen Mills.
Atlanta, Ga., 1500 tons, superstructure for post office; bids to be opened Dec. 28 by Supervising Architect, Treasury Department, Washington.

CENTRAL STATES

Xenia, Ohio, 155 tons, Soldiers' and Sailors' Home.
Columbus, Ohio, 500 tons, grandstand for Columbus Baseball Club.
State of Ohio, 200 tons, bridges; bids Nov. 27.
White County, Ill., 800 tons, State highway bridge.
Alma, Wis., 620 tons, Lock No. 4 on Mississippi River; bids extended from Nov. 17 to Dec. 17.

WESTERN STATES

San Francisco, 350 tons, cancer ward at city hospital.
Los Angeles, 220 tons, transit sheds for inner harbor.
Kettleman Hills, Cal., 550 tons, refinery for Texas Oil Co.
Long Beach, Cal., 200 tons, foundation for water tanks.

CANADA

Cobourg, Ont., 400 tons, hotel for Harry Alexander, care of Arlington Hotel.
Hamilton, Ont., 500 tons, station on Hughson Street for T. H. & B. Railway.
Toronto, 400 tons, office building for North America Life Assurance Co.

FABRICATED PLATE

AWARDS

Evanston, Ill., 450 tons, water tank, to Chicago Bridge & Iron Co.

PENDING PROJECTS

Rock Island, Ill., 1800 tons, fabricating rolling dam for Government; bids open Dec. 18.
Gary, Ind., 450 tons, gas holder for Illinois Steel Co.
Cleveland, 3000 tons, rebuilding lake boat.
Washington, 300 tons, fuel oil barges for Government.
Denver, 1000 tons, steel pipe for city.
Denver, 500 tons, structures for Federal Bureau of Reclamation; Babcock & Wilcox Co., Barberton, Ohio, low bidder.
Seattle, 1000 tons, Beacon Avenue pipe line.

Tacoma, 475 tons, Hood Street station pipe lines.
Los Angeles, 525 tons, pipe line and penstocks.

Reinforcing Steel

Awards 1525 Tons—New Projects 4000 Tons

Shrewsbury, Mass., 175 tons, State bridge, to Joseph T. Ryerson & Son, Inc.
Providence, R. I., 100 tons, school, to Truscon Steel Co.
St. Nicholas, Pa., 200 tons, foundations for Philadelphia & Reading Coal & Iron Co., to Kalman Steel Co.
Philadelphia, 150 tons, foundations for post office, placed by Gow Contracting Co. with Taylor-Davis, Inc.
Columbia, S. C., 650 tons, Veterans' Hospital, to Southern General Fireproofing Co.
Springfield, Ill., 100 tons, State road work to Calumet Steel Co.
American Lake, Wash., 150 tons, Veterans' Hospital, to Pacific Coast Steel Co.

NEW REINFORCING BAR PROJECTS

Washington, 530 tons reinforcing bars and mesh, superstructure for United States Supreme Court Building; General contract awarded George A. Fuller Co., Washington and New York.
Washington, 310 tons, two buildings and addition, St. Elizabeth's Hospital; W. E. O'Neil Construction Co., Chicago, low bidder for general contract.
Poughkeepsie, N. Y., 450 tons, Hudson River State Hospital.
Boston, 600 tons, State office building.
Sharon, Walpole, Norwood, Mass., 675 tons, State road and bridge.
Smithfield, North Smithfield, Lincoln, R. I., 200 tons, mesh for State road.
State of Massachusetts, 150 tons, State road.
Wilmington, Del., 250 tons, bridge; general contractor Seeds & Derhan, Philadelphia.
State of Illinois, 100 tons, highway bridge, Seymour Construction Co., general contractor.
Aurora, Ill., 250 tons, post office; H. G. Christman, South Bend, Ind., general contractor.
Chicago, 700 tons, Cook County Hospital Nurses' Home; Mutual Construction Co., general contractor.
Chicago, 500 tons, Lucy Flowers School.
Alma, Wis., 300 tons, Lock No. 4 on Mississippi River; bids extended from Nov. 17 to Dec. 17.
Rock Island, Ill., 5000 tons, lock and dam for United States Government, bids open Dec. 17.
Agnew, Cal., 100 tons, foundation for tank.
San Luis Obispo County, Cal., 113 tons, highway bridges.

Railroad Equipment

Class I railroads on Nov. 1 had 6485 locomotives in need of repairs, or 12 per cent of the number on line, according to the Car Service Division of the American Railway Association. This was a decrease of 114 locomotives below the number in need of repair on Oct. 15. On Nov. 1, 194,948 freight cars were in need of repairs, or 9 per cent of the number on line, an increase of 662 cars over the number in need of repair on Oct. 15.

These railroads on Nov. 7 had 559,278 surplus freight cars in good repair and immediately available for service.

Southern Persian State Railways have ordered four locomotives of 2-6-0 type from Baldwin Locomotive Works.

Boston & Maine has authorized construction of 25 caboose cars at its Concord, N. H., shops.

Reading Co. has arranged for changing 10 of its regular passenger train cars into trailers for its electric service.

Northern Pacific has issued formal inquiry for 150 50-ton, all steel, hopper cars.

Illinois Central has program for reconditioning 400 coal cars a month.

Industry Should Promote the Farm Home

(Concluded from page 1369)

bearing wire, which forms a large part of the output of the Wickwire plant. Also the management has caught the relatively new idea in the steel industry of trying to improve its product in advance of demand rather than to get the new specifications or a call for a modified product from its customers. For example, a new wire product will shortly be announced that represents something developed to meet a problem of one of its customers in the manufacturing field.

The Wickwire Brothers works are noteworthy in being thoroughly integrated within a single fence, so to speak. The company is a close corporation established in 1873 and incorporated in 1892, with the stock closely held in the Wickwire family. The company makes both its own steel and its own power. It was a pioneer in weaving wire cloth, credit going to Chester F. Wickwire, who in the early 1870's conceived the idea of revamping an old carpet loom to handle wire as a fabric.

Besides making wire for all kinds of manufacturing purposes, and wire rods, fencing wire, wire cloth, poultry netting and coarse, heavy netting for sieves, it produces wire nails and staples of a wide variety of sizes and kinds. And for all of these it maintains a warehouse in Cortland that serves as a reservoir into which the mills may deliver fairly steadily and

out of which prompt shipments may be made in accordance with seasonal demands.

To add to the outlets of steel, the continuous rod mill is now being fitted up to be operated also as a bar mill. The additions together with a Belgian type two-stand rolling mill heretofore not often used will produce steel bars for consumers not yet served by the company.

President Wickwire, besides having naturally a purview over the administrative affairs of the company, is interested in the operating activities, including metallurgy as well as the engineering. The dominant industrial figure of Cortland, it follows that he is called on for numerous and varied public services. One finds he was the food administrator of the district during the war and the head of relief drives last winter. And besides being president of the board of public works of Cortland, and president of the Cortland public library, also vice-president of the local national bank and a director in the local electric light and power company, he finds time for polo. And it is some distinction, as those acquainted with the game know, for one who can own to some thirty years of business activity to be a player of sufficient prowess to enjoy a regular place on a polo team which crosses mallets with representative clubs from cities over a wide range of territory.

The interview, together with the accompanying brief sketch, gives some insight respecting the responsibilities and obligations which attach to the headship of a large manufacturing enterprise in a relatively small city.

Soviets Propose Cut in Manganese Output

WASHINGTON, Nov. 24.—The Soviet authorities have planned a heavy reduction in the output of manganese ore during the current year, according to a report from Landreth M. Harrison, third secretary of legation, Riga, made public by the Department of Commerce.

In the fiscal year 1929-30, Soviet Russia produced 1,444,166 metric tons, roughly 44 per cent of the total for the world. The planned output for the calendar year 1930 was 1,583,000 metric tons; it has been set at 960,000 tons for 1931, a reduction of 623,000 tons, or approximately 40 per cent. This planned reduction amounts to 43 per cent of the actual output in the fiscal year 1929-30, the last 12-month period for which definite production statistics are available.

Trade observers state that this reduction in the planned output appears highly significant, especially since Soviet Russia is making great efforts to increase production in almost every line, and since the domestic consumption of manganese is increasing rapidly due to the expansion of the Soviet

steel industry under the five-year-plan. Exports are of vital importance to the Soviet Union in providing a means to pay for the imports necessary for the industrialization intended by the five-year-plan, and manganese ore is the most important in the group of mineral ores exported. It comes from two rich deposits which are located comparatively close to shipping points.

New Standard Steels from Bureau of Standards

The United States Bureau of Standards has prepared a standard sample of high sulphur steel (0.60 per cent sulphur) containing 0.193 per cent carbon. This steel, though not of a commercial grade, was specially prepared to provide a standard sample which would serve to meet all conditions encountered in carbon determinations on commercial high sulphur steels.

This standard, which is No. 105 in the series and certified for carbon only, costs \$1 per sample of 150 grams. The sample may be paid for in advance with the order, or be sent

parcel post c.o.d. in the United States and its possessions. All foreign shipments require prepayment, together with 20c. additional postage.

The Bureau of Standards is also preparing a standard analyzed sample of nitralloy "G" steel (approximately 1.3 per cent chromium, 1.1 aluminum, and 0.20 molybdenum), which will be available for distribution about Feb. 1, 1932.

British Hardware Orders Aid German Makers

HAMBURG, GERMANY, Nov. 16.—Substantial orders for Continental products, placed by the British immediately after their general election, which indicated application of a tariff, have greatly aided the German hardware manufacturing industry. Makers of cutlery, small tools, implements of various kinds and light castings have a good backlog of orders, and this has indirectly aided the steel industry.

Gray Iron Institute to Hold 30 Local Meetings

A series of over 30 local group meetings will be held by the Gray Iron Institute in various centers during the winter. Scheduled meeting places include Chicago, Milwaukee, Cincinnati, Cleveland, St. Louis, Kansas City, Minneapolis, Detroit, Philadelphia, Pittsburgh, Buffalo, New York and New England cities. Arthur J. Tuscany, manager of the institute, will be in charge of the meetings and will discuss the institute's program of technical, cost accounting and merchandising services.

German Wages Decline Less Than Price Index

HAMBURG, GERMANY, Nov. 16.—In a little more than a year, wage reductions in German industry have ranged from 6 to 12 per cent, but in the same period the price index of retail commodities is off 15 to 18 per cent.

In the steel industry wage reductions have been about 8 per cent in western Germany, 6 to 7 per cent in the South, 9 per cent in the East and 6 per cent in central Germany. By the end of this year, however, further reductions of steel wages by 4 to 5 per cent are expected.

The iron mining industry has made an 11 per cent reduction, the non-ferrous industry a 6 to 7 per cent drop, with the reduction 10 to 12 per cent in copper mining and smelting. The wage decline in the machinery industry has been 7½ per cent in central Germany, including Berlin, and 8 to 9 per cent in other districts.

British Await New Steel Duties; Baldwin Predicts International Trade Control

(By Cable)

LONDON, ENGLAND, Nov. 23.

ADPTION by the Government of the "abnormal importations" bill has revived the belief that assistance will be extended to the steel industry. There is some disappointment that iron and steel were not included in the first tariff list, but it is expected that iron and steel duties will be introduced this week.

Sales of pig iron have been substantial and Cleveland furnaces are booked with orders for delivery into 1932. As a result, increase in pig iron output is believed near.

Canadian buying has been the mainstay of heavy steel business, which continues small. Recently Guest, Keen & Nettlefolds, Ltd., shipped steel plates 58 ft. in length, 7 ft. wide and $\frac{3}{4}$ in. thick and weighing three tons each for use in Canada.

In a recent public statement, Stanley Baldwin predicted that the steel trade of the world would eventually be under international control with all world markets allocated.

Welsh tin plate business is dull with buyers and sellers awaiting decision by the Government on sheet bar imports. Welsh sheet bar mills have formulated a rebate plan for users who buy Welsh material exclusively, and are awaiting replies from the tin plate makers.

Tin plate mills with low priced sheet bar contracts are still accepting business down to 13s. 9d. (\$2.72) per base box, f.o.b. works port. Export inquiry is moderate with the Continent, Canada and the Far East showing interest in buying.

Continental iron and steel business has improved and mills report an improved volume of sales to the Far East and Latin America. Mills generally, however, are still in need of

tonnage and gold pound sterling prices are being shaded.

It is generally believed that the West European Pig Iron Entente will terminate at the end of the year. A majority of the members of the International Rail Makers' Association recently met and favored renewal of the agreement for another 18 months from the end of this year.

Polish mills are reported to be bartering iron and steel for Yugoslavian tobacco.

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Swedish Alloy Contains Chromium and Aluminum

HAMBURG, GERMANY, Nov. 16.—A chromium-aluminum alloy containing nickel and manganese has been developed by Professor Harden of the Swedish Metallographical Institute. It is patented in Germany and Sweden under the trade name of "Chromal." The makers state that the alloy is only about 10 per cent heavier than aluminum, is equivalent to good open-hearth steel in hardness, has tensile strength ranging from 54,000 to 69,000 lb. per sq. in., and melting point of 700 deg. C. It is made in three grades containing 2 to 4 per cent chromium and varying percentages of nickel and manganese. Certain German companies have been licensed to operate under the patents.

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Bolt and Nut Makers Have Foreign Competition

Imported bolts and nuts of good quality are causing some concern to American manufacturers. Imports, as reported by the Department of

Commerce, have apparently not been excessive, totaling 756 gross tons for the first nine months of this year, including 57 tons in September.

Of the foreign bolt and nut sales, a substantial part is reported to have been to warehouse distributors. In certain cases, however, the importer offers small lots for direct shipment from his own supplies in this country.

While some substantial discounts from list were formerly quoted on the foreign product, the trend recently has been toward greater firmness, as most buyers seem well satisfied with the quality. The current price of the imported product is usually 73, 20 and 5 per cent off list quoted to large users or to jobbers. Where the importers make deliveries direct from stock in New York, Philadelphia or Boston, the discount is at times 73 and 10 per cent off list for small lots and 73, 10 and 10 per cent off for medium-sized orders.

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Polish Mills Suspend Work on Soviet Orders

BERLIN, GERMANY, Nov. 15.—As a result of the decline in value of the pound sterling and impossibility of obtaining advances against drafts drawn on the Soviet Government, the Baildonhütte and the Huta Pokoja in Poland have been unable to meet their payrolls this week. The Koenigs und Laurahütte, which is also working on steel orders for the Soviet, has informed the trade delegation that it will be unable to execute orders in hand totaling 75,000 to 80,000 tons. No action has been taken yet, but the Soviet trade delegation in Warsaw is expected to enter suit in the Polish courts to force execution of the contracts.

British and Continental European Export Prices f.o.b. United Kingdom and Continental Ports

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton, £ at \$3.96

Ferromanganese, export.	£9 0s.		\$35.64
Billets, open-hearth.....	5 7½	to 5 12½s.	21.23 to \$22.19
Black sheets, Japanese specifications.....	9 15	to 10 0	38.61 to 39.60
Tin plate, per base box..	0 14	to 0 14¼	2.77 to 2.82
			Cents a Lb.
Steel bars, open-hearth..	7 17½	to 8 7½	1.39 to 1.48
Beams, open-hearth.....	7 7½	to 7 17½	1.30 to 1.39
Channels, open-hearth..	7 12½	to 8 2½	1.34 to 1.43
Angles, open-hearth.....	7 7½	to 7 17½	1.30 to 1.39
Black sheets, No. 24 gage	8 5	to 8 10	1.46 to 1.50
Galvanized sheets, No. 24 gage.....	9 2½	to 9 5	1.61 to 1.63

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$4.86

Billets, Thomas.....	£2 13s.	\$13.36 to \$13.61
Wire rods, No. 5 B.W.G.	5 5	25.51
Black sheets, No. 31 gage, Japanese.....	11 5	54.68
		Cents a Lb.
Steel bars, merchant....	2 19	0.65
Beams, Thomas.....	2 19	0.65
Angles, Thomas, 4-in. and larger.....	2 19	0.65
Hoops and strip steel over 6-in. base.....	3 15	0.83
Wire, plain, No. 8.....	5 0	to £5 1¼s. 1.09 to \$1.10
Wire, barbed, 4-pt., No. 10, B.W.G.....	8 10	1.87

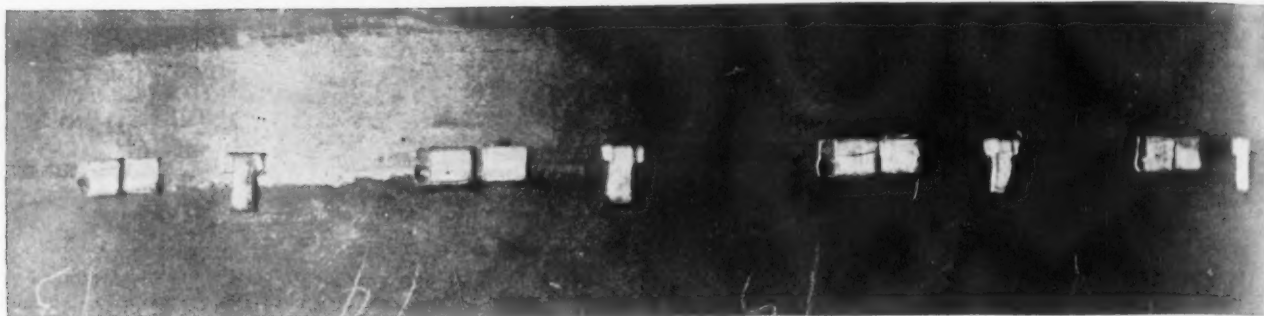


Fig. 7.—A modern method of marking is to use a steel tape with the lead tabs fastened on it. This tape is then stretched along the side of the weld which is to be X-rayed.

Welding and Testing a New Cracking Unit

(Concluded from page 1365)

these it may be interesting to repeat here. The X-ray tube used was a Coolidge-type air-cooled tube rated at 200,000 volts and 8 milliamperes. The current for this tube enters the plant at 2300 volts and is stepped up by transformer within the portable X-ray room to the desired voltage. The cassettes or film holders used were made of hard wood, the back side or cover being held in place by a double spring arrangement. A layer of sponge rubber was used back of the film to produce an even pressure over the entire film and back of that a layer of lead-rubber was placed to absorb any rays that might pass through the screens or the sponge rubber.

The method of marking was that familiar in X-ray testing. A steel tab with lead identification markers attached by means of adhesive tape was placed adjacent to the weld under examination. For the longitudinal joints the markers were spaced 12 in. apart and for the circumferential joints they were spaced 9 $\frac{1}{4}$ in. apart. In addition to these lead markers, other markers of steel of the same material as the plate but machined to a thickness of 2 per cent of the plate, were used.

However carefully X-ray photographs of welded joints may be made, the final test which determines the value of these photographs comes in the interpretation. With thick walls it is possible to make double exposures from slightly different angles from which it is possible to judge the depth of a defect

with fair accuracy. In the examination of the tanks for the Bayonne unit X-ray photographs covering each inch of the walls were carefully examined and rechecked and whenever serious defects appeared, the location of these was rephotographed and rechecked before deciding to chip or machine out and reweld. The sample X-ray photographs in Fig. 2 indicate variations in conditions. Photograph A is that of a perfect weld, the deposited material having almost identical density with the base metal. At B the weld is fair, the deposited metal is somewhat porous as indicated by the small white spots. The weld at C is poor, showing both serious porosity in the deposited metal and lack of fusion with the base metal. The section at D shows a case of inclusions, porosity and lack of fusion in the weld. Cases similar to C and D would be immediately rejected.

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Commends Association Advertising

"THE cancellation of our advertising campaign has been a very definite loss to us and one that has been recognized vociferously by many of our members," declared Charles N. Fitts recently in addressing the American Institute of Steel Construction of which he is president. "To them I can only offer my sympathy and my hope that the institute can soon see its way clear to resume advertising upon a scale in keeping with the importance of the industry."

"We cannot overlook our duty in this regard. So potent has advertising been in this work that we find many of the trade associations continuing their campaigns right through the period of the depression, curtailing in other directions so that their advertising can be maintained."



THE shipment of the bubble tower from Barberton to Bayonne is thought to set a record for shipment of a single large piece of equipment over American railroads. Tunnel clearances and curve limitations prevent future shipment of items showing any appreciable increase in size.

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Unemployment Insurance a Palliative Not a Cure, Says Conference Board

(Concluded from page 1375)

lean thought is to regard all insurance schemes from this point of view and to deny an insurance character to many projects that assume the name. Compulsory unemployment insurance regarded from this technical point of view is at best quasi-insurance. Its closest analogy to general insurance practice is to what is known as assessment insurance, a form of enterprise that is generally recognized as taking the name without having the substance of insurance.

"In calling attention to these distinctions there is no desire to confuse issues. That confusion already exists. Terms and phrases have been bandied about in popular discussion with flagrant disregard of their true significance. The examination of fundamental meanings should help to clarify rather than confuse thought on this subject.

Possible to Apply Insurance Principles in Limited Way

"Although unemployment in general cannot be dealt with on an insurance basis, it is possible to apply insurance principles to unemployment if the insurance plan is definitely limited in coverage and is held strictly within the limits laid down at the start.

"The limits of insurance as applied to unemployment are strikingly illustrated in the history of the British system. In its early stages this system did not aim to be comprehensive. It was confined to a restricted field of operation and provided limited benefits of definite duration. As originally conceived, the system was based on the fundamental principle of sound insurance practice, namely, selection of risks. The early success of the system was due to the restrictions and safeguards with which it was surrounded. Its later failure is traceable to the removal of these limitations. As a limited insurance plan, it succeeded; as a general relief scheme, it failed. The early success of the British system cannot, however, be cited as an argument in favor of State unemployment insurance. Under existing political conditions there is every reason to expect that any plan of compulsory public unemployment insurance, however carefully safeguarded at the start, would pass through the same metamorphosis as did the British system, finally emerging as the dole in periods of business depression.

"While a private unemployment insurance plan could be kept within the limits essential to successful operation, experience shows that this is not practicable in the case of a general plan of compulsory public unemployment insurance.

"A public unemployment insurance

scheme is subject to constant and irresistible pressure to broaden the coverage. Inevitably in the course of time the limits are extended, the restrictions are relaxed, the principles of sound insurance are abandoned, and the plan is transformed from an insurance system into a general indiscriminate unemployment relief scheme.

Objections to Plan Cited

"Experiments with public unemployment insurance in other countries have demonstrated that, largely in consequence of the impossibility of keeping it within proper insurance limits, it is open to serious objections, among which may be mentioned:

It tends to encourage idleness, weakening the incentive of the individual worker to find employment and to keep at work, and virtually putting a premium on unemployment.

It restricts the mobility and adaptability of labor, impedes the free movement of workers from one occupation and one place to another, handicaps industry in making the readjustments necessary to sound business recovery in times of depression, and retards industrial progress at all times.

It offers no inducement to employers to take measures for the prevention of unemployment, but on the contrary it penalizes the employer who maintains a high average level of employment, since he is obliged to contribute more proportionately to the insurance fund than the employer who has a low average.

It bears unjustly on the industrious, regularly employed workers, who are compelled to contribute to the support of the habitually or voluntarily unemployed.

It imposes a heavy burden of expense on industry and on the Government.

It sets up a cumbrous and burdensome bureaucratic system.

It destroys the growth of voluntary private unemployment benefit and insurance plans.

"The development of private unemployment insurance plans, which must be kept within the limits previously indicated if such plans are to succeed, represents at best only a partial solution of the problem of unemployment.

"These plans are properly restricted to the permanent labor force, which ranges in general from 60 to 80 per cent of the total payroll. The residual body of unemployed must be regarded as a charge not on industry but on society, to be cared for by adequate and humane measures of public and private relief.

"Unemployment insurance is not immediately applicable as a remedy for the present unemployment

emergency, which must therefore be met by relief measures, and these should be frankly recognized and represented as such and not camouflaged as insurance.

No Plan Could Be Made Effective for Current Needs

"It is evident that no plan involving insurance principles in any degree could be made effective to meet current needs of the wage-earning classes. Insurance is essentially a provision against future contingencies, not a remedy for present ills. It implies the disbursement of funds created by continued savings by or for those insured. It implies also a definite indemnity limited in part by loss sustained and in part by the amount of the contributions to the fund. It is impossible under our insurance plan to create funds over night or to disburse indemnities from such funds in indefinite amounts and for indefinite periods. In an era of declining employment insurance benefits limited in amount and duration will leave the recipient, when they are exhausted, without safeguards against the distress of unemployment.

"The value of the various proposals put forward lies not in the probability of immediate achievement but in the promise of future usefulness. They need behind them a number of good years if they are to be effective in the lean years that are to come. It would be unfortunate if the present emergency, which has given rise to the current discussion of schemes of public or private insurance against unemployment, were to pass away without constructive effort. It would be still more unfortunate if the present emergency should impel men either by legislative enactment or by private initiative into the adoption of plans that were hastily conceived, based on false promises, and incapable of attaining the results expected of them. But, since all of these plans build for the future rather than the present, there is the greater need for careful thinking and deliberate purposeful action. There must be a clear conception, lacking for the most part today, of the field within which effective action is possible.

"Unemployment insurance must be regarded merely as a partial palliative of the hardships of unemployment, not as a cure.

"The ultimate objective in organizing and administering any plan of insurance is the prevention or reduction of the hazard. Just as life insurance companies undertake educational propaganda for the prolongation of human life, as fire insurance companies encourage the adoption of measures of fire prevention, and as casualty insurance companies place a premium on the installation of safety devices and the organization of safety work among employees, so unemployment insurance plans should be accompanied by systematic measures for stabilizing employment and reducing unemployment to a minimum."

PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Inquiry Shows Further Gain

▲ ▲ ▲
MANY Companies Getting Estimates on Equipment, Presumably for 1932 Modernization Plans
▼ ▼ ▼

THE most significant change in machine tool markets is the growing number of inquiries, many of which are presumed to be for 1932 modernization programs. Manufacturers are now preparing their budgets for the new year. In some instances machine tool builders have been asked to rush estimates.

If general business shows definite signs of recovery in the first quarter, it is now believed that equipment replacement will bring a marked change in the volume of machine tool buying.

While orders this month have been slow to materialize, there is an opinion in some quarters that the month may show a slight gain over Octo-

ber for a good many machine tool builders.

Automobile business has been the outstanding item in the Chicago district. The Studebaker Corp., South Bend, Ind., has placed further orders, and several tools have been purchased by the Nash Motors Co., Kenosha, Wis.

New York

While sellers report a slight increase in the number of inquiries for one and two machine tools, part of this apparent improvement is attributed to the fact that prospective buyers are obtaining information necessary in making 1932 appropriations. The United States Navy, which is taking bids on two engine lathes for San Francisco, accepting quotations f.a.s. New York, has inquired for a gap lathe for San Diego, Cal., and a cutter grinder for the Philippine Islands, bids to open Dec. 24. A short list of machine tools for the Wassaic State School at Wassaic, N. Y., includes a small engine lathe, grinder, drill and pipe threading machine, bids to open Nov. 27.

Chicago

Further sales to the Studebaker Corp., South Bend, Ind., and several purchases by Nash Motors Co., Kenosha, Wis., lend a more cheerful tone to this market. Another favorable factor is the interest shown by users, sometimes in the form of actual inquiries, although they generally admit that their needs are what they expect to require in 1932.

Milwaukee

For most tool builders in this locality, November business will show a fair gain over that in October. The outlook for the early months of 1932 is considered more favorable. Business has been largely in tool room equipment, but sales of production tools are now expected to assume more bulk. Tool and die shops report a slight pick-up.

Cleveland

An improvement in inquiry is reported by machine tool manufacturers, some of whose estimating departments are being kept busy. In several cases tool builders have been requested to rush estimates. While little inquiry is coming direct from motor car manufacturers, some parts manufacturers are inquiring for machines for production work on parts for new model automobiles. Jobbers report sales and inquiry light. Business with a number of manufacturers will show a slight uptrend in October over that in November. Orders for screw machine products show a fair increase.

Pittsburgh

While new orders for machine tools reflect no change in volume, new inquiry continues to be encouraging. More companies are beginning to think about plant modernization and, if general business shows significant improvement after the first of the year, orders for machine tools are almost certain to gain. Definite inquiry is still largely lacking and business in prospect will not likely reach that stage until early in 1932.

Steel company improvement programs are going forward, but the major changes in this district are largely completed. A Youngstown steel company has placed orders for a strip mill in a northern Ohio plant to cost about \$500,000.

New England

Some high-priced equipment has been sold the past week or 10 days for replacement purposes. While sales have not been large, they were the most encouraging in a long time.

In addition, manufacturers' representatives for the first time in months are evincing a growing interest in up-to-date equipment and have obtained quotations. It is not expected that these inquiries will result in business this year, but it is reasonably certain industries have equipment plans for early 1932.

A New England school job, involving considerable shop equipment, is in the market. These and other developments, including a \$3,000,000 observation plane contract, placed by the Government with the Chance Vought Corp., East Hartford, Conn., which will keep the plant busy for 14 months, opening of the Canadian Pacific Railroad shops at Lyndonville, Vt., closed since Oct. 1, construction of 25 steel cabooses at the Boston & Maine Railroad's Concord shops, providing employment there into February, and slow yet steady improvement in working schedules in more important New England industrial plants give machine tool manufacturers and dealers a decidedly more optimistic outlook.

Cincinnati

An increase in bookings of small lathes brought the November business of district machine tool manufacturers a trifle ahead of that in October. Demand showed no change from the preceding week, although sentiment continues good. Increased activity among automotive manufacturers is expected to bring a post inventory improvement in orders. Inquiry, however, is light.

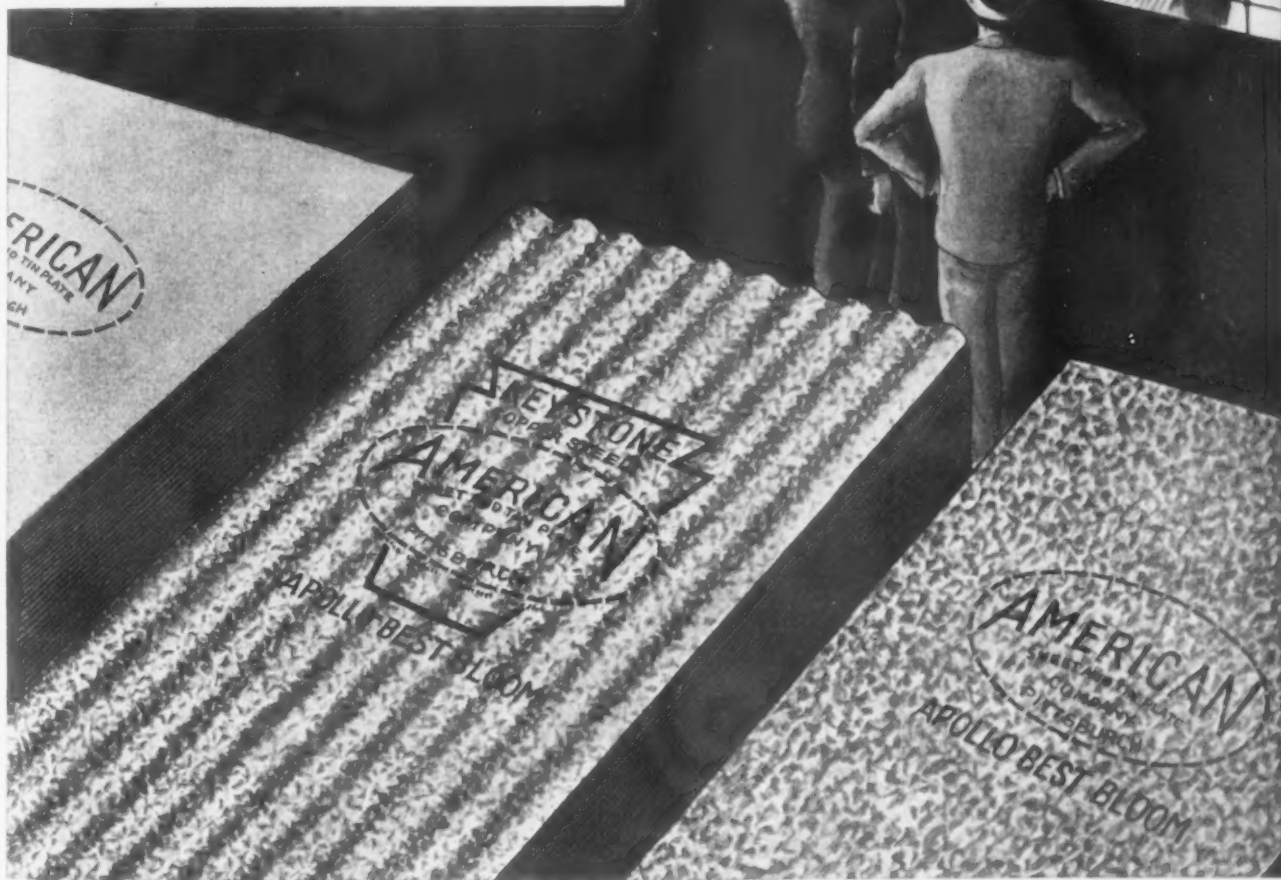
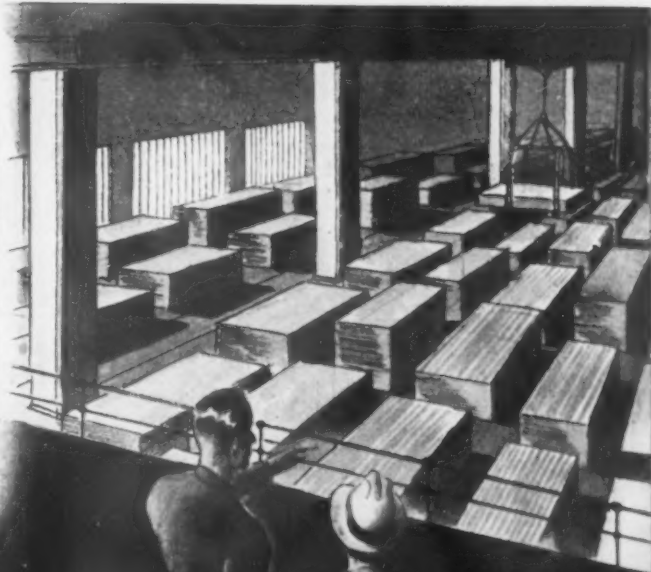
A local builder of engine lathes received an order for three 14-in. lathes for a school in California. Other purchases were for single tools.

-AMERICAN-

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ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY

OIL WELL SUPPLY COMPANY
THE LOHAN STEEL COMPANY
TENNESSEE COAL, IRON & RAILROAD CO.
UNIVERSAL ATLAS CEMENT COMPANY

◀ NEW YORK ▶

Kruffi Garage Corp., New York, leased six-story building at 32-34 West Sixty-sixth Street, for automobile service, repair and garage building.

Superintendent of Lighthouses, Third District, Staten Island, N. Y., is asking bids for 85,200 lb. wrought iron mooring chain, $\frac{3}{4}$ to 1 $\frac{1}{2}$ in., 8700 wrought steel shackles, 140 pieces wrought iron swivels, one cast steel anchor, one mushroom anchor.

Kings County Lighting Co., 6740 Fourth Avenue, Brooklyn, is considering extensions and improvements in gas plant on New Utrecht Avenue and Sixty-second Street, including additional equipment. Cost over \$85,000.

Service Die Cutting Co., 202 Canal Street, New York, has leased space in building at 155 Sixth Avenue for plant.

Bronze-Craft, Inc., organized by Harvey M. Lewin, 245 West 104th Street, and Max Gladstone, 1245 Grant Avenue, to manufacture bronze and bronze alloy products.

Texas Corp., 135 East Forty-second Street, New York, let contract to P. M. Sterling, 230 Park Avenue, for oil storage and distributing plant in Brooklyn. Cost about \$50,000 with equipment.

Socony-Vacuum Corp., 26 Broadway, New York, formed by recent merger of Standard Oil Co. of New York, and Vacuum Oil Co., has organized Standard-Vacuum Transport Co., to take over and expand tanker fleets of both units and other bulk transportation facilities.

Board of Education, 50 South Third Avenue, Mount Vernon, N. Y., contemplates manual training department in multi-story George Washington school. Bids asked on general contract in December. Cost about \$450,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 1 for 27,000 doz., 6000 doz. and 1360 doz. hacksaw blades.

John D. Campbell Mfg. Co., organized by John D. Campbell, 561 Eightieth Street, and Andrew M. Nilsen, 740 Fifty-first Street, Brooklyn, to manufacture wire goods.

Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, contemplates two-story storage and distributing plant in Minneapolis, Minn. Cost about \$90,000. H. W. Carver, 600 Stinson Boulevard, Minneapolis, general superintendent, Middle Western Division.

United States Trucking Corp., 17 Battery Place, New York, plans motor truck service, repair and garage building. Philip Bades, 230 Grand Street, architect.

Board of Education, White Plains, N. Y., is considering manual training department in three-story and basement addition to Battle Hill school. Cost \$1,000,000. D. M. W. Contracting Co., 2058 Fulton Street, Brooklyn, general contractor. Starrett & Van Vleck, 393 Seventh Avenue, New York, architects. Work is under way.

Jersey City Welding & Machine Works, Jersey City, N. J., recently organized, purchased property on Grand Street, 50 x 140 ft., for one-story plant.

Kelly-Magus Engine Mfg. Co., Newark, care Herman W. Brams, 951 Broad Street, attorney, organized by Daniel Magus, Irvington, N. J., and Rodney B. Kelly, Brooklyn, capital \$125,000, to manufacture gas and gasoline engines and parts.

Lever Brothers Co., Cambridge, Mass., manufacturer of soaps, let general contract to White Construction Co., 95 Madison Avenue, New York, for several units of new plant at Edgewater, N. J. Cost over \$500,000 with machinery. Stone & Webster Engineering Co., Boston, engineer.

Manasquan Ice Block & Storage Co., Manasquan, N. J., will rebuild ice-manufacturing and refrigerating plant, including power house, recently damaged by fire. Loss about \$75,000 including equipment.

Novelty Case Mfg. Co., Newark, organized to take over and expand company of same name, with plant at 101 Pedie Street, manufacturer of paper and corrugated board containers, etc. Same interests organized Durobord Products Co., to manufacture cardboard, corrugated board, etc.

◀ NEW ENGLAND ▶

L. T. Wood, Manchester, Conn., contemplates one-story ice-manufacturing plant, 61 x 124 ft., electric-operated. Cost \$70,000 with machinery.

Board of Contract and Supply of Metropolitan District, 550 Main Street, Hartford,

Conn., asks bids until Dec. 7 for one portable air compressor and one sand-washing machine for municipal water department.

Simplex Wire & Cable Co., 66 Sidney Street, Cambridge, Mass., let general contract to Chase & Gilbert, Park Square Building, Boston, for three-story addition and improvements in present plant. Cost about \$75,000 with equipment.

Augustus W. Hennessey, 364 Atlantic Avenue, Boston, and associates organized Jackson Mfg. Corp., to operate machine shop and foundry.

Board of Education, Providence, R. I., is considering manual training department in new two-story school on Windmill Street, 208 x 307 ft. Cost \$800,000. Tucker Construction Co., Industrial Trust Building, general contractor.

Department of Correction, Commonwealth of Massachusetts, State House, Boston, plans one-story sheet metal-working shop at State prison, Norfolk. Cost over \$50,000 with equipment. McLaughlin & Burr, 88 Tremont Street, Boston, architects.

Viking Flying Boat Co., New Haven, Conn., Mark Linenthal, 250 Devonshire Street, Boston, engineer, in charge, let contract to National Construction Co., 152 Temple Street, New Haven, for hangar, 86 x 100 ft., with shop and repair facilities, and building, 26 x 100 ft., at New Haven municipal airport. Cost about \$50,000 with equipment.

Elm City Garage, 127 Meadow Street, New Haven, Conn., plans rebuilding part of service, repair and garage building recently destroyed by fire. Loss over \$100,000 with equipment.

Enterprise Machine Works, Reading, Mass., manufacturer of textile machinery, parts, etc., secured building at Lawrence, Mass., and will remove and expand plant.

Sawyer Engineering Co., Milford, Conn., organized by J. K. Sawyer, West Haven, Conn., and M. A. Pond, Milford, capital \$50,000, to manufacture refrigerating equipment, parts, etc.

School Board, Portland, Conn., plans manual training department in two-story senior-junior high school, 60 x 125 ft. Cost about \$200,000. Bids soon asked on general contract. Townner & Sellow, Inc., Middletown, Conn., architects.

Middletown Silver Co., Middletown, Conn., is operating at capacity with full working force.

Wiltbranco Mfg. Co., Jamaica Plain district, Boston, machine tool equipment, was sold at auction Nov. 18.

Frederick J. Dixon, 340 State Street, Bridgeport, Conn., architect will take bids Jan. 1 on a \$700,000 junior and senior high school containing four shops.

John Heidtman, Deep River, Conn., has purchased Mt. Carmel Mfg. Co., and will move plant and equipment to Deep River where toy airplanes and other novelties will be manufactured.

Winsted Insulated Wire Co., Winsted, Conn., recently organized to take over company of same name which was in receivership, has received a large order and has started operations.

◀ PHILADELPHIA ▶

United States Metallic Packing, 429 North Thirteenth Street, Philadelphia, leased three-story factory, 106 x 150 ft., to be erected by Rehmanny Realty Co., and will increase present capacity. Cost over \$75,000 with equipment. Clarence E. Wunder, Architects Building, architect.

Mitchell Auto Devices Corp., Philadelphia, organized by Henry A. Sampson, 2005 West Girard Avenue, city, and Josef Cisar, 701 Lawson Avenue, Penfield, Pa., to manufacture automotive equipment, hardware specialties for automobiles, and kindred products.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 1 for 210,000 ft. steel cable, and 158 aluminum chairs; until Dec. 8 for torsion meters and spare parts for Philadelphia navy yard.

Klein Stove Co., Trenton and Tioga Streets, Philadelphia, subsidiary of Caloric Gas Stove Works, same address, leased 20,000 sq. ft. in factory at Erie Avenue and Sepviva Street, for storage and distributing plant.

State Purchase Commissioners, State House, Trenton, N. J., asks bids until Dec. 8 for motorcycle parts; until Dec. 7 for snow plows and for cast iron sign posts.

Non-Skid Markwick Chains, Inc., West Pittston, Pa., organized by Fred T. Martin, R. D. No. 2, Falls, Pa., and Donald B. Foster, 11 York Avenue, West Pittston, to manufacture non-skid chain links, tire chains, etc.

Atlantic Refining Co., 260 South Broad Street, Philadelphia, is carrying out expansion and improvements at Philadelphia oil refinery, including installation of coking equipment to handle heavy residues. Cost over \$250,000 with machinery.

Patterson Burial Vault Co., Waynesburg, Pa., recently organized by J. Arthur Patterson, Waynesburg, and associates, will soon begin production of patented metal-concrete burial vaults in local plant.

White Sewing Machine Co., Cleveland, manufacturer sewing machines and parts, leased three-story building at Market and Redfield Streets, Philadelphia, for factory branch and distributing plant. Local offices now at 1332 West Girard Avenue.

Seranton Electric Co., Scranton, Pa., authorized installation of underground transmission lines for high-tension service in different parts of city. Cost about \$500,000.

◀ BUFFALO ▶

Buffalo, Rochester & Pittsburgh Railway Co., 155 Main Street West, Rochester, N. Y., will build engine house with shop facilities at Buffalo. Cost about \$40,000 with equipment.

Utica Gas & Electric Co., Utica, N. Y., has authorized extensions and improvements in hydroelectric power plant at Trenton Falls.

Emson, Inc., Buffalo, organized by DeForest E. Muth, 180 Sanders Road, and Hyman Carrel, 637 West Delevan Avenue, capital \$50,000, to manufacture electric signs and displays.

Northern New York Utilities Corp., Public Square, Watertown, N. Y., contemplates artificial gas plant and extensions in lines at Howard, N. Y. Cost over \$75,000.

H. W. Knight & Son, Inc., Seneca Falls, N. Y., being formed to take over and expand partnership of H. W. Knight & Son, manufacturers of brass, white metal and other metal pattern letters and specialties. Horace D., Robert W., and Robert Knight, heads.

Lycorning United Natural Gas Corp., Wayne, N. Y., being organized to take over Lycorning Natural Gas Corp., operating in Wayne and Tioga, Pa., gas fields. New company will expand properties for service in eastern part of New York and later in New England.

◀ CHICAGO ▶

Illinois Water Service Co., South Van Buren Street, Freeport, Ill., contemplates installation of elevated steel tank and tower in connection with expansion program. Cost \$100,000. W. A. Hutchins, superintendent.

Town Clerk, Manilla, Iowa, asks bids until Dec. 7 for one vertical type Diesel oil engine, multi-cylinder, with accessories, for municipal electric power station.

Board of Education, City Hall, Minneapolis, begins superstructure soon for three-story and basement vocational training school on Third Avenue South. Cost \$700,000 with equipment. Bureau of Buildings, Architectural Division, 811 N. E. Broadway, architect. George F. Womrath, business superintendent.

Noble & Peterson, Inc., Chicago, organized to take over and expand company of same name with radio equipment plant at 303 West Washington Street, and electrical appliance plant at 4712 West Twenty-second Street, Cicero. Hubert M. Noble and Grover A. Peterson, head new company.

Berst-Forster-Dixfield Co., Cloquet, Minn., manufacturer of wood products, let general contract to James Leek Co., 211 South Eleventh Street, Minneapolis, for three-story and basement plant, 105 x 274 ft. Cost over \$100,000 with equipment. Homan W. Hallock, Oswego, N. Y., architect.

Common Council, Milford, Iowa, called special election Nov. 30 to vote bonds for \$80,000 for a municipal electric light and power plant.

United States Engineer Office, St. Paul, Minn., asks bids until Dec. 17 for construction of main lock and portion of auxiliary lock on Mississippi River, near Alma, Wis., including steel and iron castings, etc.

Board of Water Commissioners, City Hall, Minneapolis, plans one-story equipment storage and distributing plant, 66 x 116 ft., with repair shop. Cost about \$40,000 with equipment. A. M. Larson, City Hall, architect.

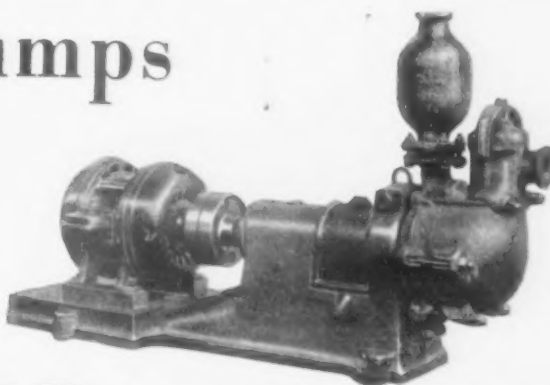
Central Broadcasting Station, WHO, Liberty Building, Des Moines, Iowa, plans new broadcasting station, including power station, etc. Cost about \$100,000 with equipment.

Oriental Wrought Iron Works, Inc., Chicago, organized with capital of \$40,000 to take over and expand company of same name at 1255 South Michigan Avenue. Jack H. Kane heads new company.

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with Duriron Pumps
is SIMPLER,
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No. 80 Self-priming Centrifugal Pump

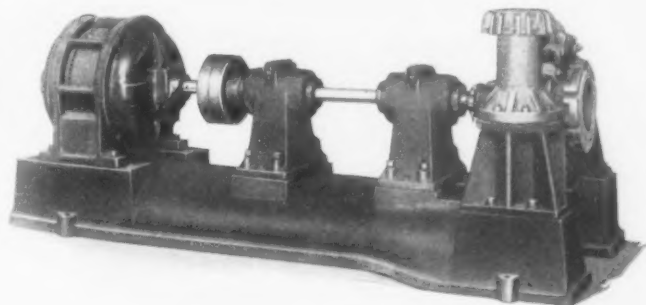
Needs no priming or foot valve. Has 2" suction and 2" discharge. For quantities up to 100 gallons. May be operated with remote control.

A tank car of sulphuric acid can be unloaded in 80 to 90 minutes with a Duriron Self-priming Centrifugal Pump. Not only is the Duriron method a speedy way to get acid to storage tanks, but it also is *safe*. The acid is drawn off without air pressure and the consequent danger of water collecting to cause fuming, thus eliminating a possible chance of accident from this source.

Handling waste acids from pickling tanks is another job for which Duriron Pumps are ideally suited. Troublesome problems confronting many a plant can be solved by putting a Duriron Pump to work in clearing sumps and in circulating spent solutions in the neutralizing tanks.

Sizes of Duriron Centrifugal Pumps range from 2-in. suction and 1½-in. discharge to 10-in. suction and 8-in. discharge, handling from 20 to 1400 gallons per minute. Smaller sizes are self-priming. Ruggedly constructed and *acid-resistant inside, outside and all the way through*, they are especially economical under erosive as well as corrosive conditions.

Careful analysis of your requirements will be made by Duriron engineers on your request. Write for particulars. Also ask about other Duriron pickling equipment—corrosion-resistant valves, pipe and fittings, steam jets, tank outlets, tie rods and cranes.



No. 806 Centrifugal Pump

Has 8" suction and 6" discharge. Other Duriron Centrifugal Pumps give a range from 2" x 1½" to 10" x 8", with relatively high capacities. Rating charts show the marked efficiency of these units. All are thoroughly resistant to both corrosion and erosion, resulting in greater operating economy.

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DURIRON

◀ ST. LOUIS ▶

Kroger Grocery & Baking Co., 35 East Seventh Street, Cincinnati, plans call for bids soon on general contract for four-story and basement plant, 85 x 130 ft., at St. Louis, with traveling ovens, conveying, mixing and other machinery; one-story automobile service, repair and garage unit and boiler plant. Cost about \$750,000 with equipment. Emil H. Niemann, 3816 Shaw Avenue, St. Louis, architect.

Landon Airlines, Municipal Airport, Kansas City, Mo., Thad G. Landon, head, let contract to W. K. Martin Construction Co., Dwight Building, for one-story hangar, repair and reconditioning shop. Cost about \$40,000 with equipment.

City Council, Princeton, Mo., plans installation of electric-operated pumping machinery in connection with extensions in municipal waterworks. Bonds for \$35,000 authorized. Charles A. Haskins, Finance Building, Kansas City, Mo., consulting engineer.

Fort Scott Hydraulic Cement Co., Fort Scott, Kan., engaged Charles A. Smith, Finance Building, Kansas City, Mo., architect, to draw plans for rebuilding mill recently destroyed by fire. Loss about \$50,000 including equipment. Architect will handle machinery installation.

Controlled Heat, Inc., St. Louis, organized by Harvey H. Sims, 80 Arundel Street, to manufacture heat regulating devices and equipment.

Motor Electric Service Co., 3912 Washington Street, has plans by Benjamin Shapiro, Syndicate Trust Building, architect, for one-story service and repair building. Cost about \$25,000 with equipment.

Federal Compress Co., Memphis, Tenn., contemplates rebuilding plant at Searcy, Ark., recently destroyed by fire. Loss over \$200,000 including equipment.

Sequoyah Marble Corp., care of W. K. Palmer, Pickwick Hotel, Kansas City, Mo., engineer and director, plans purchase of quarrying and mill machinery, crane, etc., for quarries near Marble City, Sequoyah County, Okla., recently acquired.

◀ SOUTH ATLANTIC ▶

Tainton Research Corp., 3100 Elm Avenue, Baltimore, U. C. Tainton, head, has option on tract at Sparrows Point and plans erection of one-story galvanizing works.

Ford Motor Co., Dearborn, Mich., purchased 5-acre tract at Alexandria, Va., and contemplates factory branch, storage and distributing plant.

Chemical Warfare Service, Edgewood Arsenal, Md., asks bids until Nov. 30 for three plate grinders; until Dec. 1 for two exhaust fans; until Dec. 2 for 1950 shell forgings.

Neelro Co., Baltimore, care of Harry Adelberg, Calvert Building, attorney, organized by Harry Yaffe and others, to manufacture tools and mechanical devices.

Domestic Utilities, Garrison Boulevard and Western Maryland Railroad, Baltimore, manufacturer of refrigerating machinery and parts, has plans for rebuilding factory recently damaged by fire.

City Council, Augusta, Ga., authorized bond issue of \$2,500,000 for steam-operated and hydroelectric generating plants for municipal and county service. Augusta Canal Commission, Augusta, will be in charge. Initial plans call for Diesel engine type, followed by water power station on Augusta Canal, with transmission system. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., consulting engineer.

Constructing Quartermaster, Army Department, Langley Field, Va., asks bids until Dec. 2 for electric distribution system.

Procurement Division, Veterans' Administration, Washington, asks bids until Dec. 7 for manual training equipment, including one power band saw, one power universal saw, one manual training and woodworking bench, one wood-turning lathe, one portable jointer, one scroll saw, one electric glue pot.

Capital Traction Co., Washington, plans expansion and modernization program, including cars, rolling stock, repair and reconditioning facilities, etc. Cost \$700,000.

Standard Oil Co. of New Jersey, St. Paul and Franklin Streets, Baltimore, plans bulk oil storage and distributing plants at Staunton and Danville, Va. Cost about \$60,000 each with equipment.

United States Coast Guard Headquarters, Washington, asks bids until Dec. 21 for 12,000 ft. galvanized plow steel wire rope.

Public Improvement Commission, City Hall, Baltimore, H. J. Leimbach, engineer, will install manual training department in one and two-story school, 245 x 295 ft. Bids asked on general contract in February. Cost about \$450,000. Mackenzie & Cross, Professional Building, architects; Reeder, Eiser & Akers, 916 North Charles Street, mechanical engineers.

Board of Engineering Equipment, Fort Humphreys, Va., asks bids until Dec. 2 for quantity of phosphor bronze and manganese castings.

◀ DETROIT ▶

McInerney Spring & Wire Co., Grand Rapids, Mich., leased factory on Cottage Grove Avenue and will increase capacity.

Evans Products Co., Union Trust Building, Detroit, manufacturer of automobile loading equipment, crates, etc., affiliated with Evans Loading Co., purchased land at Jasper, Tex., for new plant. Cost about \$100,000 with machinery.

Detroit Name Plate Co., 684 East Congress Street, Detroit, manufacturer metal name plates, plans one-story factory.

Consolidated Concrete Machinery Corp., Adrian, Mich., plans early removal to Alpena, Mich., where operations will be consolidated with Besser Mfg. Co., manufacturer kindred mechanical equipment, controlling Consolidated company.

Simpson Speed Unit Corp., 4210 Woodward Avenue, Detroit, organized by Harold P. Brittain, 8208 Wisconsin Avenue, and associates, capital \$50,000, to manufacture power equipment, speed engines, parts, etc.

McCord Radiator & Mfg. Corp., 2587 East Grand Boulevard, Detroit, manufacturer of automobile radiators, has perfected new line of unit heaters for factories, garages, and plans large capacity in new division.

Reynolds Wheel Co., Bangor, Mich., manufacturer of automobile wire wheels, is installing additional equipment and will increase working force.

Edison Sault Electric Co., Sault Ste. Marie, Mich., secured permission for high-tension transmission line to Manistique, Mich., and vicinity and will begin work soon. Cost over \$100,000 with power substation and switching facilities.

Koebel Diamond Tool Co., Detroit, organized by Charles J. Koebel, 1200 Oakman Boulevard, and associates to manufacture tools, precision machinery and parts.

Hudson Motor Car Co., 12601 East Jefferson Street, Detroit, is increasing production with reemployment of about 2000 men. More than 5000 additional workers will be engaged before close of year.

Aetna Portland Cement Co., Bay City, Mich., plans expansion at branch mill, Essexville, Mich., including additional equipment.

American Blower Corp., 6000 Russell Street, Detroit, is considering plans for one-story factory. Cost over \$75,000 with machinery.

Philfuels Co., General Motors Building, Detroit, manufacturer of butane gas for industrial heating, has changed its name to Philgas Co. Personnel remains unchanged, according to G. G. Oberfell, president. Philgas Co. is a subsidiary of Phillips Petroleum Co.

◀ CLEVELAND ▶

Moore Enameling & Mfg. Co., West Lafayette, Ohio, manufacturer of enameled iron products, plans one-story addition. Cost about \$40,000 with equipment.

Ohio Public Service Co., Hanna Building, Cleveland, is disposing of bond issue of \$3,434,000, part of proceeds for expansion and improvements. Company is operated by Cities Service Power & Light Co., New York.

Board of Education, Strasburg, Ohio, contemplates manual training department in two-story senior-junior high school. Cost \$100,000. R. F. Medicus Engineering Co., Home Savings & Loan Building, Youngstown, Ohio, architect and engineer.

Great Lakes Welding Co., Cleveland, organized to take over and expand company of same name at 1724 Rockwell Street, V. R. Holt and Clyde L. Morse head new company.

Electric Auto-Lite Co., Champlain and Mulberry Streets, Toledo, Ohio, recalled over 250 workers and is increasing production. Electric clock division is running at capacity.

◀ PITTSBURGH ▶

United States Engineer Office, Pittsburgh, asks bids (no closing date stated) for power house at lock No. 4, Monongahela River, Pa.; also for locks at fixed dam, Montgomery Island, Ohio River.

Metal Package Corp., McKeesport, Pa., manufacturer of cans and metal food containers, etc., subsidiary of McKeesport Tin Plate Co., acquired factory at Chicago for new plant. Executive offices are at 110 East Forty-second Street, New York.

Blacktop Equipment Corp., Johnstown, Pa., organized by H. V. Brown, treasurer, and R. F. Faunce, Johnstown, to manufacture road-building and other highway machinery and parts.

Matthews Oil Corp., Bingham, Pa., plans rebuilding air pressure plant and other units recently destroyed by fire. Loss about \$30,000 including machinery.

Board of Education, Shaler Township, Glenshaw, Pa., authorized manual training department in new three-story and basement high and grade school, and asks bids on general contract. Cost over \$200,000. Ingham & Boyd, Empire Building, Pittsburgh, architects.

Pittsburgh Valve, Foundry & Construction Co., Twenty-sixth Street and Allegheny Valley Railroad, Pittsburgh, acquired plant and business of Alloy Welding & Mfg. Co., Pittsburgh, and will consolidate.

Dulany-Mayne Co., Pittsburgh, organized by John R. Dulany, 3101 Brownsville Road, and L. F. Mayne, 130 South Fairmont Street, to manufacture lubricating oils, greases and other refined oils.

Central Tube Co., Ambridge, Pa., recently recalled about 50 men and is increasing production.

◀ CINCINNATI ▶

Department of Public Works, Ohio-Hartman Building, Columbus, Ohio, asks bids on general contract until Dec. 2 for two-story automobile service, repair and garage building, 60 x 120 ft., near Middletown, Ohio. T. Ralph Ridley, address noted, engineer.

Early & Daniel Co., 6 East Fourth Street, Cincinnati, plans rebuilding grain elevator, recently destroyed by fire. Loss about \$100,000 including equipment.

T-K-F Engineering & Laundry Machinery Co., Cincinnati, care of Gallagher & Dorr, First National Bank Building, has been organized by Edward R. Dorr and Thomas A. Gallagher to manufacture laundry machinery and parts.

North Ridge School District, North Ridge, near Dayton, Ohio, contemplates manual training department in junior high school addition. Cost \$175,000. Walker & Norwick, American Building, Dayton, architects. E. F. Coy, R. D. No. 5, Dayton, clerk of school district.

Cincinnati Union Terminal Co., Temple Bar Building, Cincinnati, is disposing of bond issue of \$12,000,000, part of fund for expansion of cold and dry storage and distributing terminal facilities.

Constructing Quartermaster, Bowman Field, near Louisville, let general contract to Harman Engineering Co., 844 Rush Street, Chicago, for hangar, 120 x 290 ft., with shop and reconditioning facilities. Cost over \$100,000 with equipment.

City Council, Ludlow, Ky., contemplates installation of electric-operated pumping machinery in connection with waterworks expansion and improvements. Bonds voted for \$120,000.

Brighton Screw & Mfg. Co., 1456 Harrison Street, Cincinnati, filed plans for alterations and improvements in machine shop.

◀ MILWAUKEE ▶

Thilmany Pulp & Paper Co., Kaukauna, Wis., placed contracts for factory-office-warehouse extension, 80 x 216 ft., and addition to machine room, 43 x 280 ft., with Permanent Construction Co., 735 North Water Street, Milwaukee. Cost complete, \$125,000.

Common Council, Kewaunee, Wis., is considering \$25,000 bond issue for additional equipment for municipal light and power plant. James W. Cain, city clerk.

Wisconsin Gas & Electric Co., 613 Fifty-sixth Street, Kenosha, Wis., placed general contract with Lindemann Construction Co., 4724 Fifth Avenue, for rebuilding existing structure, 130 x 240 ft., into interurban car barn and service shop.

Taxicab Mfg. Co. of America, Inc., Hartford, Wis., has been incorporated to manufacture

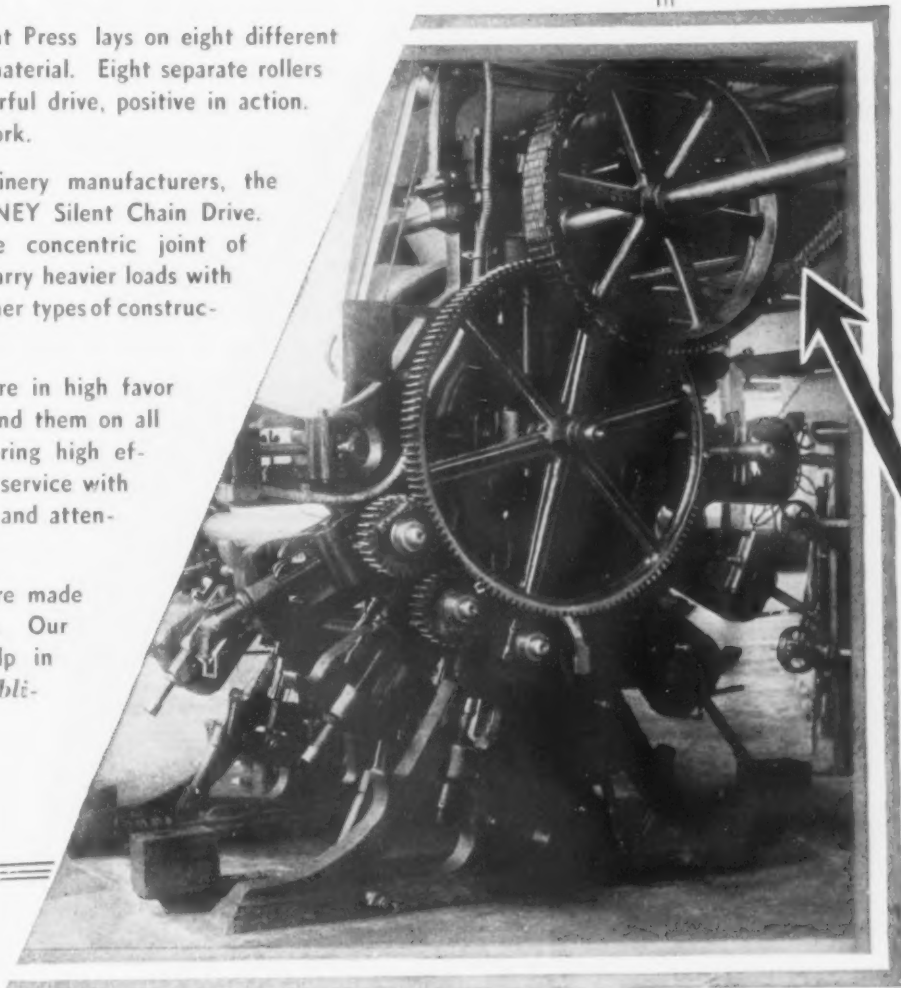
WHITNEY Chains Answer Many Difficult Power Drive Problems

THIS huge textile color Print Press lays on eight different colors at one pass of the material. Eight separate rollers under tension, call for a powerful drive, positive in action. For stoppages mean spoiled work.

Like so many other machinery manufacturers, the engineers called for a WHITNEY Silent Chain Drive. They know that the double concentric joint of WHITNEY Silent Chain will carry heavier loads with less elongation and outwear other types of construction, *many times over.*

WHITNEY Silent Chains are in high favor for power drives. You will find them on all types of machines; all delivering high efficiency; all good for years of service with the minimum of maintenance and attention.

WHITNEY Silent Chains are made to meet specific applications. Our engineers offer technical help in design matters—*without obligation.*



WHITNEY CHAIN DRIVES

THE WHITNEY MFG. COMPANY

HARTFORD, CONNECTICUT

ATLANTA, GA.

Cox Foundry & Machine Co.,
985 Cox Avenue, S. W.

BOSTON

The Whitney Mfg. Co.,
250 Stuart Street

BUFFALO

Potter & Dugan, Inc., Agents,
Court & Wilkeson Sts.
Bickford & Francis Belting Co.,
Distributors—Pearl Street

CHICAGO

The Whitney Mfg. Co.,
549 W. Washington Blvd.

CLEVELAND

The Whitney Mfg. Co.,
1213 W. Third Street
Smith Power Trans. Co.,
Penton Building

DALLAS

O. H. Holman Co.,
111 North Race St.

DENVER, COLO.

Colorado Gear Mfg. Co.,
1361-71 S. Broadway

Sales and Engineering Offices:

DETROIT

The Whitney Mfg. Co.,
2240 General Motors Bldg.

GASTONIA, N. C.

Precision Gear & Machine Co.,
791 E. Franklin Street

LOS ANGELES

A. H. Condes Co.,
2911 Santa Fe Ave.

NEW YORK

L. C. Biglow & Co., Inc.,
250 W. 54th Street

PHILADELPHIA

The Whitney Mfg. Co.,
133 S. 36th Street
Phila. Gear Works,
Erie Avenue & G Street

PITTSBURGH

Pittsburgh Gear & Machine Co.,
27th & Sunniman Streets

PORTLAND, ORE.

Portland Iron Works,
495 Northrup Street

SAN FRANCISCO

A. H. Condes Co.,
615 Howard Street

SEATTLE

Berg-Evans Chain Co.,
1729 First Avenue, So.

SYRACUSE

George McPherson,
291 Norwood Ave.

taxicabs and has leased two floors of Kissel Motor Car Co. factory. Company has no relationship with Kissel company, property of which is to be sold at receivers' auction Nov. 27.

Edwin Berg has become associated with Matthew Salchert in welding and general machine shop business at Antigo, Wis., occupying Salchert shop at 520 Dorr Street.

General Hardware Corp., 240 North Milwaukee Street, Milwaukee, formerly General Grinder Corp., is placing in production power grinders, household tool grinders, bench vices, mechanical fruit juice extractors and other specialties. Capital stock has been increased from \$50,000 to \$100,000.

◀ INDIANA ▶

Chesapeake & Ohio Railroad Co., Richmond, Va., asked bids on general contract for one-story engine house, 30 x 150 ft., with shop facilities at Peru, Ind. Cost about \$40,000 with equipment.

Board of Education, Angola, authorized installation of manual training department in new two-story and basement high and grade school. Cost \$160,000. Bids asked soon on general contract. Pohlmeier & Pohlmeier, Central Building, Fort Wayne, architects.

National Electric Control Corp., Indianapolis, organized by Arnold F. Hoppe, 5031 West Fifteenth Street, and associates to manufacture electrical equipment and devices.

Schwitzer-Cummins Co., 1125 Massachusetts Avenue, Indianapolis, manufacturer of automobile and tractor fans, parts, etc., let contract to Hetherington-Berner Co., 701 Kentucky Avenue, for one-story and basement addition, 49 x 100 ft.

Indiana Service Corp., Fort Wayne, acquired plant and system of Churubusco Water & Light Co., Churubusco and vicinity, and will consolidate. Plans extensions in district noted, including transmission lines.

Bendix Aviation Corp., South Bend, is increasing capacity in automobile and aircraft equipment divisions. All departments are on two-shift basis and clutch control division goes on three-shift schedule Dec. 1. Additions are being made to working force.

A. Johnson Forge & Machine Co., South Bend, has broken ground for new factory, 60 x 100 ft. A switch will be built into plant.

◀ GULF STATES ▶

City Council, Ruston, La., contemplates installation of compressor plant and other equipment for natural gas service, and distributing lines. Pipe line planned to Monroe, La., gas field. Cost \$185,000 with equipment.

Board of Public Works, Dallas, Tex., plans installation of electric-operated pumping machinery and other equipment in sewage disposal plant. Cost \$1,500,000. Hawley, Freese & Nichols, Fort Worth, Tex., consulting engineers.

American Cane Products Corp., care of Scofield & Scofield, Inverness, Fla., attorneys and representatives, plans alcohol plant near Inverness, with crushing, grinding and other machinery. Cost about \$100,000 with equipment. A. A. Marshall is one of heads of company.

United States Engineer Office, New Orleans, asks bids until Dec. 15 for gates and machinery for lock in Louisiana and Texas Intracoastal Waterway, near Harvey, La., including gate-operating machinery, valve-operating machinery, air compressor, etc.; 250,000 lb. of steel castings and 63,300 lb. of iron castings.

Pattilo & Russell, Selma, Ala., wholesale grocer, plans rebuilding storage and distributing plant recently destroyed by fire. Loss over \$100,000 including equipment.

Allis-Chalmers Mfg. Co., Milwaukee, has arranged for factory branch, storage and distributing plant at Amarillo, Tex., and will take over agricultural machinery branch of Advance-Rumely Co., La Porte, Ind., recently acquired. Machine shop will be operated. J. M. S. Stiles is local manager.

Southwestern Gas & Electric Co., Shreveport, La., disposed of bond issue of \$2,300,000, part fund for extensions and improvements in power plants and transmission lines.

United States Engineer Office, Jacksonville, Fla., asks bids until Dec. 1 for hammerwelded pipe for dredge service.

Rex Mfg. Co., Majestic Building, Fort Worth, Tex., John R. Griffin, head, recently organized,

plans manufacture of portable heaters and parts.

Board of Trustees, Tuskegee Normal and Industrial Institute, Tuskegee, Ala., takes bids at once for mechanical equipment for three-story and basement Thomas A. Edison science and industrial school. Cost about \$275,000 with equipment. L. H. Persley, head, Architectural Division, in charge. C. E. Posey, 2159 Eleventh Court, Birmingham, engineer.

Magnolia Petroleum Co., Dallas, Tex., subsidiary of Standard Oil Co. of New York, will carry out expansion in storage and distributing plant at Corsicana, Tex. Cost about \$75,000 with equipment.

United States Engineer Office, Vicksburg, Miss., asks bids until Dec. 2 for building three steel hulls for motor boats, each 31 ft. long.

◀ PACIFIC COAST ▶

Pacific Gas & Electric Co., 245 Market Street, San Francisco, authorized expansion and improvements in power substations and transmission lines in Lodi, Cal., district. Cost about \$225,000 with equipment.

Atchison, Topeka & Santa Fe Railway Co., 560 South Main Street, Los Angeles, plans electric power house at shops at Needles, Cal. Cost over \$65,000 with equipment.

Stauffer Chemical Co., 3200 East Twenty-sixth Street, Los Angeles, manufacturer of industrial chemicals, organized Pacific Hard Rubber Co. as a subsidiary. Superstructure soon to begin for one-story plant, about 16,000 sq. ft. Cost \$50,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 8 for electric-driven worm-gear winches and spare parts for Mare Island and Puget Sound navy yards; one corrugated suspension furnace for Seattle; parts for gasoline engines for motor boats for Mare Island yard.

California Carbonic Ice Mfg. Co., 200 Bush Street, San Francisco, plans call for bids in 30 to 60 days for dry ice-manufacturing plant. Cost over \$200,000 with machinery. C. A. Winder, Fourteenth floor, address noted, engineer.

Universal Scaffolding Co., Los Angeles, care of Salisbury & McNeil, Roosevelt Building, attorneys, organized by B. R. Ware and Gerald R. Knudson, to manufacture scaffolds and kindred products.

Los Angeles School District, Los Angeles, contemplates installation of manual training department in addition to school on North Highland Avenue. Cost about \$100,000. Marsh, Smith & Powell, Architects' Building, architects.

Sopac Mfg. Co., San Fernando, Cal., care of William V. Kernan, Board of Trade Building, Los Angeles, architect, plans one-story bottling plant. Cost about \$24,000 with machinery. Otto Menzing, president.

Board of Public Works, City Hall, Sacramento, plans four pumping plants with electric-operated pumping machinery and accessories in connection with expansion at municipal filtration works; two plants to have capacity of 25 million gal. a day each, and two, 20 million gal. a day each. Cost over \$200,000. Fred J. Klaus, City Hall, engineer; Harry N. Jenks, Berkeley, Cal., consulting engineer.

◀ CANADA ▶

Metal Etchers & Manufacturers, Toronto, has concluded negotiations with Stanley Mfg. Co., Dayton, Ohio, whereby a subsidiary will be formed completely owned by Metal Etchers company to manufacture Stanley products in Canada under name of Stanley Mfg. Co., Ltd. New company has obtained manufacturing space at 514 King Street East, Toronto.

McAleer Mfg. Co., Ltd., of Canada, has been incorporated to operate a plant at Walkerville, Ont. C. H. McAleer, president, McAleer Mfg. Co., Detroit, is president and treasurer. Company manufactures automobile cleaning and polishing materials.

Service Stations, Ltd., Toronto, has purchased business and plant of Tennent's Steel Containers, Ltd., Granville Island, B. C. Company will manufacture containers, pumps, meters, etc., for handling gasoline, oil, paint and other commodities.

Dominion Bridge Co., Vancouver, B. C., has taken out permit for a workshop. Cost \$16,000. This is first of new units to be built.

◀ FOREIGN ▶

Traction & Electricite, Ltd., Brussels, Belgium, is arranging for increase in capital from 120,000,000 to 190,000,000 Belgian francs (from \$16,680,000 to \$26,410,000) and bond issue of 150,000,000 Belgian francs (about \$20,850,000), portion of fund for acquisition of electric light and power properties and extensions in plants and system.

Secretary of Public Works, Wellington, New Zealand, is asking bids until Feb. 2 for switchgear, reactors, spare parts and accessory electrical equipment for power plant at Lake Coleridge.

Argentine Association of Grain Cooperative Societies, Buenos Aires, Argentina, has approved contract with Americana Fomento Rural, Buenos Aires, for 130 grain elevators in Buenos Aires, Santa Fe and Cordoba Provinces. Cost over \$5,000,000 with equipment.

Soviet Russian Government, Moscow, has approved plans for early erection of plant at Kiev for building surface street cars, with parts and assembling departments. Cost over \$1,500,000. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

Kirloskar Brothers, Ltd., manufacturing farm machinery at Kirloskarvadi, district of Satara, India, desires information on low-priced, uniform steel housing. Company maintains a manufacturing town of about 1000 population.

Agarwal Iron Works, Agra, India, is in the market for equipment for production of malleable iron castings. Company desires full information and prices.

New Trade Publications

Variable-Speed Transmissions.—Reeves Pulley Co., Columbus, Ind. Profusely illustrated 74-page catalog, No. 99, covering the company's transmission units which employ opposed-cone-faced disks and belts with hardwood blocks to provide infinite variable-speed control. The book is divided into six sections devoted to detailed description of construction features, design of remote control units and accessories, automatic speed control, standard equipment applications, specific industrial uses and general engineering data.

Finned Tubes and Pipes.—Schutte & Koerting Co., Philadelphia. Tubing up to 3-in. and steel pipe up to 6-in. sizes fitted with spiral radiating fins for use in air heating, air cooling and similar equipment are described in bulletin No. 11-S on "Radiafin" products.

Power Pumps.—Worthington Pump & Machinery Corp., Harrison, N. J. Specification sheet No. D-412-S6 covering horizontal duplex, 6-in. stroke pumps for general service.

Lever Shears.—United Engineering & Foundry Co., Pittsburgh. Booklet illustrating line of alligator shears; sizes included have maximum capacities on cold soft steel from 1 x 4-in. to 4 x 24-in. flats.

Gear Burnishers.—City Machine & Tool Works, Dayton, Ohio. Folder describing hand-operated, semi-automatic and full-automatic burnishing machines for spur and helical gears.

"How to Obtain Maximum Service from a Bucket Elevator" is outlined in a bulletin published by the Link-Belt Co., Chicago. Ralph McMillan, construction superintendent of the company and author of the treatise, suggests that overloading be avoided and that roominess in the elevator is essential to long life. The receiving point should be well above the foot shaft and the discharge chute of ample size and at a suitable angle to provide immediate freeing of material. Advantages of positive drives in dust-tight casings, and the use of take-ups, pillow blocks, etc., having ample grease or oil-storage facilities are outlined. Material dropping down the elevator casing is emphasized as a signal that the elevator should be stopped for inspection.

Precision Boring Machines.—Ex-Cell-O Aircraft & Tool Corp., Detroit. Six-page folder, profusely illustrated, describes double-end precision boring machine and holding fixtures. Specifications are given.

Gear Burnisher.—City Machine & Tool Works, Dayton, Ohio. Bolender hydraulic and air-controlled gear burnishers are described in a 4-page folder.

A New Service for Steel Users

ILLINOIS SCULLY STEEL WAREHOUSE COMPANY

Subsidiary of United States Steel Corporation



A Consolidation of Illinois Steel Warehouse Company *and* Scully Steel and Iron Company

Former management of the two companies will be retained in the new organization. All Chicago warehouse stock will be consolidated at 1319 Wabansia Avenue where additional warehouse space will accommodate a greater variety of light and heavy rolled steel products, specialties and machinery.

General Offices and Warehouse

1319 Wabansia Avenue

Chicago

Warehouses

Chicago · St. Paul · St. Louis

Business as Others See It

Digest of Current Financial and
Economic Opinion

WAITING for something to turn up, like Mr. Micawber, is the general attitude of business, according to diverse reports. *Commerce and Finance* finds "optimism more readily accepted," but *Financial Chronicle* thinks the situation "less hopeful," and believes that American interests abroad are being highly prejudiced—notably in the Orient and in the matter of international indebtedness. This "is proving a source of uneasiness."

Renewed downward tendency is noted, also, by *Analyst*, which argues that, for our "escape from a tight place, mobility is essential," in place of the frozen condition so much in evidence. International financial snarls, according to *Commerce and Finance*, "will take at least a few months, if not a few years, to untangle." But that paper notes, as a basis for optimism, "a distinct improvement in demand."

Unsettling factors noted by New York *Times* are foreign in origin—international debts and the British tariff. Meantime our "lighter industries have been checked in their

upward climb, probably by the failure of the basic lines to improve. . . . Producers must not only investigate their own processes, but distributor and consumer markets as well, if they are going to fortify their positions next year."

Alexander Hamilton Institute finds "the reparations problem is overhanging the financial markets of the world." Germany is "confronted by three problems: Payment of reparations; repayment of short-term debts, which mature in February; payment of principal and interest on long-term obligations privately contracted abroad."

Brookmire believes that "We shall on the whole be fortunate if the better part of next year is not consumed in the necessary worldwide adjustments." And *Analyst* finds construction waning and the end reached of the "short cycle of consumer replacement" in cotton cloth, boots and shoes, wool and some other products.

National Industrial Conference Board, while noting general business activity at "a new low level," finds it "at a lower rate of decline than has been observed in recent

months." Harvard Economic Service takes encouragement from the "decrease in the volume of currency in circulation."

Discussing the agrarian situation, Harvard reports 1931 crop acreage less than 1 per cent below 1930, with a composite per-acre yield up 11.4 per cent. Disregarding later movements, "with crops definitely better than in 1930, prices received by farmers in October [had fallen] 14 per cent from their July level. . . . Expenses have not decreased in proportion to prices of products. . . . Net farm incomes will not be over two-thirds of those for 1930, which in turn were only two-thirds of those for 1929."

To the extent to which "farm families derive a fraction of their living directly from the farm," these price levels mean little. That fraction is placed at two-fifths or more. This factor lessens materially the really percentage reduction in farm incomes. "But the ability to buy goods in the market is based on cash receipts, and these have been reduced approximately in proportion to gross income."

Labor Turnover in October Still Unfavorable

Additions to payrolls in October, according to turnover figures of the Bureau of Labor Statistics, were less than one-half as numerous as separations, whereas in September they were much closer together. The accession rate of 2.75 (per cent of number on payroll) was considerably below the 3.58 in September. Also, the separation rate of 6.22 in October was well above that of 5.62 in September. As a result, the reduction in employment in October was about 3.5 per cent in the 10 industries surveyed.

An exceptionally high rate of separation was reported by the automotive industry, with 20.61 in October, nearly all of which consisted of layoffs. Against this the accession rate was 4.23, leaving a net drop of more than 16 per cent.

Iron and steel labor in September was relatively stable. The separation rate of 2.25 was the lowest of all the 10 industries, while the accession rate at 1.51 was the lowest with one exception. The loss of 0.74 per cent compares with a corresponding loss of 1.12 per cent in September in the iron and steel industry. Discharges amounted to only six men in each

10,000 employed, compared with eight men in September.

Foundries and machine shops showed lower accessions and higher separations than in September, the October figures being 2.36 for accessions and 5.17 for separations. About five-sixths of the latter were accounted for by layoffs occasioned by lack of work.

Frigitaire Corp'n. has developed a combination air and water-cooled compressor, especially designed to overcome water cooling problems in industrial plants where intense heat is encountered. An air-cooled condenser is used until temperatures rise above normal and the demand on the cooler becomes great. Automatic regulation brings an auxiliary water-cooled condenser into action, assuring a constant supply of drinking water at proper temperatures.

Making a slight gain, orders for steel furniture in the business group totaled \$1,048,565 in September, against \$1,010,306 in August, according to reports received by the Bureau of the Census from 36 manufacturers. Orders for shelving furniture in September were valued at \$303,671, compared with \$307,384 in August.

Ohio River Shipments of Steel Show No Gain

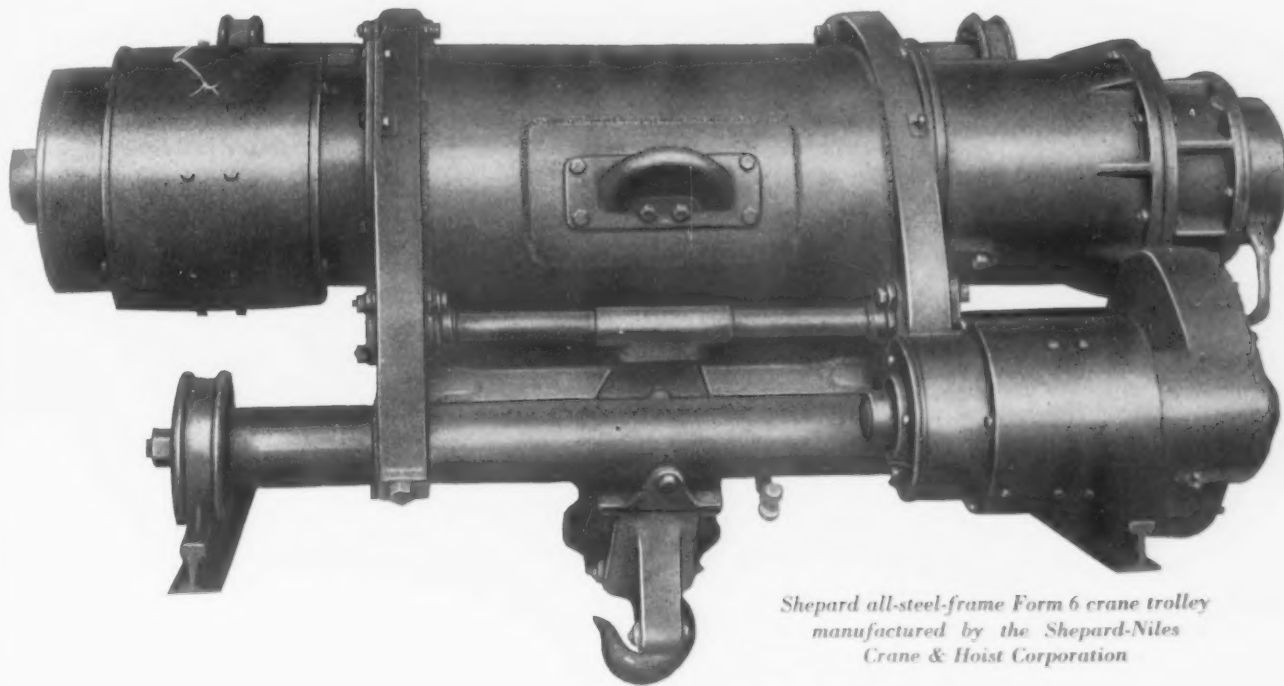
Movement of iron and steel products on the Ohio River in the Pittsburgh district during October amounted to 49,059 net tons, according to the United States Engineer Office, Pittsburgh. This compares with 49,269 tons in the preceding month, and with 138,109 tons in October, 1930. Steel and iron products moved on the Monongahela River last month totaled 34,383 tons, as compared with 25,508 tons in September and with 105,451 tons in October of last year. Iron and steel movement on the Allegheny River amounted to 2705 tons in October, 1931, 8525 tons in September, 1931, and 11,490 tons in October, 1930.

Shawinigan Chemical Co., Ltd., Montreal, has been licensed by Duriron Co., Inc., Dayton, Ohio, to produce Duriron and Duriron equipment for all of Canada and Newfoundland.

Production of railway rolling stock in Canada during 1930 was valued at \$104,922,701, according to the Dominion Bureau of Statistics, Ottawa.

PERFECT ALIGNMENT

ARC WELDING WITH G-E TYPE F ELECTRODE DID THE TRICK



*Shepard all-steel-frame Form 6 crane trolley
manufactured by the Shepard-Niles
Crane & Hoist Corporation*

ORIGINALLY assembled from cast-iron parts, to-day these frames are fabricated from steel by arc welding. Shepard-Niles modernized its construction with one thought in mind — to produce a hoist having greater rigidity and perfect alignment — easily possible by welding with the correct electrode. G-E Type F electrode did the trick for Shepard-Niles.

The welded Form 6 hoist frame, the welded equalizer sheave support, and the seamless-tube axle support are important factors in obtaining the desired rigidity and perfection of alignment. Incidentally, the welded design simplifies machining operations and permits variations of one fabricated arrangement which replace five different sizes of cast-frame construction in each capacity.

It's surprising how many jobs can be well done with Type F, a true general-purpose electrode that combines the characteristics of rapid deposition with ample penetration and unusual flexibility without sacrifice of smoothness or stability.

Further information on Type F and other G-E electrodes is given in GEC-93.

Shepard-Niles also uses G-E Type F electrode for welding cupola-charging buckets, gear enclosures, hoist load bars, equalizer beams, and numerous other items.

Type A for Cast Iron	Type B for Automatic	Type F for General Purpose	Type H for Automatic (Coated)
Type R for Quality at High Speeds	Type L for Structural	Type M for Soundness of Deposit	Type O for Medium C. Deposits

WELDING



ELECTRODES

550-5

GENERAL ELECTRIC

Great Adhesion Claimed for British Tin Coating

A British tinning and soldering compound mentioned in *THE IRON AGE*, Oct. 8, has the trade name of "Soldo" and is manufactured by the Soldo Co., Southampton Row, London, W. C. 1. The compound is intended for tinning or retinning cast iron, cast steel and non-ferrous metal bearings, preparatory to remetalling, and is claimed by the company to withstand successfully high speeds and heavy loads of modern machinery because of close adhesion between the liner and shell. This interpenetration of the compound, which has been tested by the National Physical Laboratory, England, is said by the maker to be from twice to five times other coatings.

The cleansing properties of the compound are stressed by the maker, it being pointed out that labor of cleaning preparatory to tinning is entirely eliminated, except in the case of the lower grades of cast iron. On such material sandblasting, filing or preparation with a metal brush is suggested. Aluminum is the only metal not recommended for use with the tinning compound.

Rust, corrosion or oil do not affect application of the coating, and when the metal to be coated is heated to just under red, the "Soldo," which is in the form of a gray powder, will melt when sprinkled on the hot surface. By following over with a hacksaw blade or thin wire, the rust or corrosion is thrown to the surface and wiped off.

Comparative tests of "Soldo" and usual tinning methods, carried out by the National Physical Laboratory, included the tinning of phosphor-bronze strip, manganese-bronze strip, flat steel bars, machined cast iron and rusty steel, which had been machined

and were later permitted to rust on a scrap heap. Tinning was also applied to "Ohmal," an alloy containing 3.5 per cent nickel, 9.0 per cent manganese and 87.5 per cent copper.

The method employed by the laboratory consisted in heating the metal to be tinned in a gas flame after which the compound was sprinkled over the area to be tinned. One application was sufficient for the cleaned surfaces, but two and three were necessary with the rusty steel tested. For comparison, samples of the same metals were tinned by heating and dipping into molten tin for 30 to 60 sec. Effectiveness of the tinning was judged by microscopic examination of sections through lap joints.

On the basis of these tests, the National Physical Laboratory finds by microscopic examination that there is interpenetration between metal and tin in all cases. With manganese-bronze the extent of the interpenetration was observed to be four to five times that of ordinary tinning and with phosphor-bronze about twice as great as with usual tinning methods. On steel, the relative extents of interpenetration were about equal. The effective tinning of rusted steel and cast iron was accomplished with good interpenetration of the tin with steel and iron, indicating the cleansing qualities of the compound.

Meeting of National Founders' Association

(Concluded from page 1373)

their jobs come back. In this connection, Mr. Williams stressed the importance which the automobile plays today in the life of most workers. American workingmen, he said, considered it as necessary to maintain an automobile as a roof over

their heads, and it is not at all unusual to see jobless men driving about in their own cars in the search for work.

An increase in the social-mindedness of American employers was also mentioned by Mr. Williams as another cause for the better morale among workers in these trying times. The thought that many manufacturers have advanced in recent years that mass well-being is essential to mass production has given the worker a new idea of his own importance, not only as a worker but as a consumer of the country's goods. Mr. Williams found that very few workers place the responsibility upon their own employers for present conditions. There is small acceptance today, he said, of the philosophy of the "soap box" orator.

Whatever its defects may be, prohibition, in Mr. Williams' opinion, has helped the workers to withstand the impact of the depression. From personal investigation in industrial communities he found that speakeasies are not doing a fraction of the business that was done by the old-time saloon, situated near industrial plants.

Marc A. Rose, managing editor of *Business Week*, discussed the causes and effects of the depression. He said that, although statistics do not yet show it, there is undoubtedly improvement in business.

An interesting talk on his experiences in Russia was given by John Lovett, general manager, Michigan Manufacturers' Association, Detroit.

At the Thursday morning session R. A. Bull, director, Electric Steel Founders' Research Group, Chicago, delivered a paper on the selective application of castings, and H. L. Hoefman, engineer, Link-Belt Co., Chicago, discussed modern handling methods in the foundry. Both of these papers will be published separately.

The election of officers concluded the meeting.

ALL-STEEL WALING AND SHEET PILING USED IN OPEN LAKE



THE Great Lakes Dredge & Dock Co., Chicago, has completed a new breakwater extending along the exposed lake shore in the extension of Lincoln Park, Chicago. The breakwater is faced with No. 16-25 Inland steel sheet piling and the waling is of Inland channels and bars. This is said to be the first use of an all-steel construction of this nature on a location exposed to severe storms and choppy wave action.

Since the advent of the four-high mill method of rolling steel and non-ferrous metals, the United Engineering & Foundry Co., Pittsburgh, has built and installed such equipment in 50 plants. Seventeen plants now use four-high mill equipment for cold rolling of all kinds of commercial steels, 15 plants for hot rolling of sheets, strips and plates and 12 plants on non-ferrous metals. Six plants now use this equipment for stainless steel strips, one of the most difficult of rolling mill operations because of the extreme hardness of such material.

Sales of babbitt metal in September totaled 1,355,415 lb. and production was 1,851,956 lb., against 1,376,692 lb. and 1,780,900 lb. respectively in August, according to reports made by manufacturers to the Bureau of the Census.

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